

14 CV 4321
RECEIVED

2014 JUN 13 P 9:03

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

No. U.S. DISTRICT COURT SDNY

JAMES J. FLYNN and DOMINIC A.
MORELLI,

CLASS ACTION

Individually and on behalf of all others
similarly situated,

COMPLAINT FOR VIOLATION OF THE
FEDERAL SECURITIES LAWS

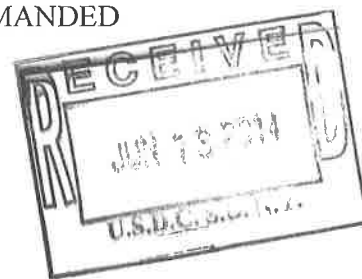
Plaintiffs,

JURY TRIAL DEMANDED

vs.

BANK OF AMERICA CORPORATION,
BARCLAYS PLC, CITIGROUP INC.,
CREDIT SUISSE GROUP AG,
DEUTSCHE BANK AG, THE GOLDMAN
SACHS GROUP, INC., JP MORGAN
CHASE & CO. LLC, UBS AG, THE
CHARLES SCHWAB CORPORATION,
E*TRADE FINANCIAL CORPORATION,
FMR, LLC, FIDELITY BROKERAGE
SERVICES, LLC, SCOTTRADE
FINANCIAL SERVICES, INC., TD
AMERITRADE HOLDING
CORPORATION, CITADEL LLC, DRW
HOLDINGS, LLC, GTS SECURITIES,
LLC, HUDSON RIVER TRADING, LLC,
JUMP TRADING, LLC, KCG HOLDINGS,
INC., QUANTLAB FINANCIAL LLC,
TOWER RESEARCH CAPITAL LLC,
TRADEBOT SYSTEMS, INC.,
TRADEWORX INC., VIRTU FINANCIAL
INC., CHOPPER TRADING, LLC, and
BIDS TRADING, L.P.,

Defendants.



X

SUMMARY OF THE COMPLAINT

1. The United States securities markets are predicated on the free interaction of the forces of supply and demand to enable a fair determination of value without artificial interference. Before the advent of the federal securities laws, courts regularly prohibited manipulative schemes that interfered with the ability of the market price to reflect the market's unimpeded judgment of fair value.¹ As a direct corollary of this principle, the duty of best execution was deemed to be "a broker's bedrock obligation,"² and has been reflected as such in the common law for hundreds of years.³ The markets have grown dramatically in complexity in recent years, while at the same time becoming greatly fragmented into separate exchanges, many of which are not visible or readily accessible to the investing public (the so-called "dark pools"). Nevertheless, that duty of best execution has become all the more essential to protect the interests of the ordinary as well as sophisticated investor.⁴

¹ In *Livermore v. Bushnell*, 12 N.Y. Sup. Ct. (5 Hun.) 285 (1st Dep't 1875), the court found an agreement to advance the selling price of a stock by fictitious dealings so as to induce unaware investors into buying was void as against public policy. Similarly, in *United States v. Brown*, 5 F. Supp. 81 (S.D.N.Y. 1933), the court held, in a scheme involving wash sales and other manipulative activity, that a member of the public was justified in supposing that the quoted price for a stock reflected true market demand, and that any scheme that interfered with the free market mechanism to arrive at such real value was illegal.

² Norman S. Poser & James A. Fanto, BROKER-DEALER LAW AND REGULATION §16.03[B].

³ Francis J. Facciolo, *A Broker's Duty of Best Execution in the Nineteenth and Early Twentieth Century*, 26 PACE L. REV. 155 (2005); *Wahl v. Tracy*, 121 N.W. 660, 661 (Wis. 1909) ("purchase at the best price obtainable whenever the purchase was made"); *Day v. Jameson*, 25 N.E. 238, 240 (N.Y.Ct.App. 1890) ("making the sale with a view to realize the greatest price practicable"); see also *Newton v. Merrill, Lynch, Pierce, Fenner & Smith, Inc.*, 135 F.3d 266, 270 (3d Cir. 1998) ("The duty of best execution, which predates the federal securities law, has its roots in the common law agency obligations of undivided loyalty and reasonable care that an agent owes to its principal."); see also Stanislav Dolgoplov, *High-Frequency Trading, Order Types, and the Evolution of the Securities Market Structure: One Whistleblower's Consequences for Securities Regulation*, U. Ill. J. L., TECH. & POL'Y (2014), available at <http://ssrn.com/abstract=2314574>.

⁴ As the SEC explained the duty of best execution more fully in the context of modern, fragmented markets: "The duty of best execution requires broker-dealers to execute customers' trades at the most favorable terms reasonably available under the circumstances, i.e., at the best

2. This securities class action is brought on behalf of public investors who purchased and/or sold shares of stock in the United States (the “Plaintiff Class”) between April 18, 2009 and the present (the “Class Period”) and who suffered trading losses caused in part by the illegal and manipulative high frequency and high volume trading methods of a sophisticated class of technology-driven entities known commonly as “high frequency traders” (the “HFT Defendants”). These illegal and manipulative methods were carried out on registered public stock exchanges with the full knowledge, approval and participation of such stock exchange principals (the “Exchange Participants”) as well as on United States-based alternative trading systems (“ATs”).

3. This scheme and wrongful course of business could not have been successful without the active participation of a defendant class of the brokerage firms entrusted to transact fairly and honestly in the purchase and sale of securities on behalf of their clients (the “Brokerage Firm Defendants”), and that collaborated with the Exchange Participants and the HFT Defendants in designing a large array of special predatory order types⁵ to take advantage of

reasonably available price. The duty of best execution requires broker-dealers to periodically assess the quality of competing markets to assure that order flow is directed to the markets providing the most beneficial terms for their customer orders. Broker-dealers must examine their procedures for seeking to obtain best execution in light of market and technology changes and modify those practices if necessary to enable their customers to obtain the best reasonably available prices. In doing so, broker-dealers must take into account price improvement opportunities, and whether different markets may be more suitable for different types of orders or particular securities.” Exchange Act Release No. 34-52827, 70 Fed. Reg. 72139, 140-41 (Dec. 1, 2005) (footnotes omitted). The SEC has also affirmed that this was one of the underlying purposes for the enactment of Reg NMS: “One of the statutory NMS objectives, for example, is to assure the practicability of brokers executing investors’ orders in the best market. Another is to assure the efficient execution of securities transactions. Neither of these objectives can be achieved if brokers cannot fairly and efficiently route orders to execute against the best quotations, whenever such quotations are displayed in the NMS.” (footnotes omitted) Exchange Act Release No. 34-61902, 75 Fed. Reg. 20738 (Apr. 20, 2010).

⁵ Even a representative of a leading securities industry group admitted that “there are predatory order types that some may argue also add liquidity, but get in the way of institutional orders.”

anomalies and other special opportunities available on each of the Exchange Participant's markets so that, coupled with the unfair and uncompetitive speed of access available to the HFT Defendants, the HFT Defendants were able to manipulate order flows, the appearance of liquidity and bid and asked spreads, to the economic harm of other market participants who had no access to and no knowledge of these special predatory order types. These and other devices, contrivances, manipulations and artifices to defraud as alleged herein were designed in a manner to and did manipulate the U.S. securities markets and the trading of equities on those markets, wrongfully diverting billions of dollars annually from Plaintiffs and the Plaintiff Class to themselves.⁶

4. Contrary to the duties imposed upon them by law, U.S. Securities and Exchange Commission ("SEC") rules and their own regulations, the Exchange Participants together with the Brokerage Firm Defendants and the HFT Defendants participated in the scheme and wrongful course of business complained of herein whereby certain market

Tom Steinert-Threlkeld, *Out of Order*, TRADERS MAG., Jan. 2013, at 20, 22 (quoting Jennifer Setzenfand, Chairman of the Security Traders Association); *see also* Scott Patterson, DARK POOLS: HIGH SPEED TRADERS, AI BANDITS, AND THE THREAT TO THE GLOBAL FINANCIAL SYSTEM (rev. ed. 2013) at 318 ("Order types are being created to attract predatory traders.") (quoting Justin Kane, Rainier Investment); *see also* Stanislav Dolgoplov, *High-Frequency Trading, Order Types, And The Evolution Of The Securities Market Structure: One Whistleblower's Consequences For Securities Regulation*, U. Ill. J. L., TECH. & POL'Y 145, 147-54 (2014), available at <http://ssrn.com/abstract=2314574>.

⁶ The 14 financial services firms identified hereinafter at ¶¶20-33 were the largest brokerage firms serving institutional and retail investors in the United States during the Class Period, and collectively with all similarly situated brokerage firms, are referred to herein as the "Brokerage Firm Defendants." In addition to trading on the accounts of their customers, certain of these Brokerage Firm Defendants also operated in-house alternate trading systems (sometimes referred to herein as "dark pools"), as well as proprietary high frequency trading desks. The 13 financial services firms identified hereinafter at ¶¶34-46, who also sometimes traded securities on behalf of investors but whose primary business was operating the largest proprietary U.S.-based high frequency trading operations during the Class Period, are referred to herein collectively with all similarly situated high frequency trading firms as the "HFT Defendants." To the extent the Brokerage Firm Defendants operated in-house high frequency trading desks, those operations are also included within the definition of the HFT Defendants.

participants were provided with material, non-public information so that those market participants could use the informational advantage obtained to manipulate the U.S. securities market to the detriment of Plaintiffs and the Plaintiff Class.

5. Notwithstanding their legal obligations and duties to provide for orderly and honest trading and to match the bids and orders placed on behalf of all investors at the best available price, the Exchange Participants and the Brokerage Firm Defendants encouraged and enabled the HFT Defendants to develop new forms of self-serving and predatory orders that would disadvantage the general investor but would induce more business to the Exchange Participants and the Brokerage Firm Defendants, and actively supported the approval and use of such special order types with the SEC. The HFT Defendants received substantial kickback payments in the form of rebates in return for providing liquidity for the ATSS run by the Brokerage Firm Defendants and the markets run by Exchange Participants, and the HFT Defendants also received access to material trading data via preferred access to exchange floors and/or through proprietary trading products.⁷ Likewise, in exchange for kickback payments, the Brokerage Firm Defendants provided access to their customers' bids and offers, and directed their customers' trades to stock exchanges and ATSS that the Brokerage Firm Defendants knew had been rigged and were subject to informational asymmetries as a result of

⁷ These practices are often described as examples of HFT scalping, fueled by the superior speed and access to timely market information available to the HFT Defendants: "HFT scalping relies on superior queue position, avoidance of market sweeps, and rebate capture. Special order types and knowledge of market microstructure that make alpha-less micro-spread capture a lucrative trading strategy." Haim Bodek, *THE PROBLEM OF HFT: COLLECTED WRITINGS ON HIGH FREQUENCY TRADING & STOCK MARKET STRUCTURE REFORM* 27 (2013). Overall, according to Bodek, certain strategies used in HFT scalping "are favorably subsidized by rebate in the maker-taker market model." *Id.* at 19-20. As Bodek goes on to observe: "HFT scalps micro-edges and rebates. Tiered rebates subsidize opportunity costs and realized losses, turning scratch trades into winners." *Id.* at 22. See also Stanislav Dolgoplov, *The Maker-Taker Pricing Model and Its Impact on the Securities Market Structure: A Can of Worms for Securities Fraud?* 31-32 (March 2014) (available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2399821).

Defendants' scheme and wrongful course of business, all of which operated to the detriment of Plaintiffs and the Class.⁸ Defendants' predatory practices included the Brokerage Firm Defendants selling "special access" to material data, including orders made by Plaintiffs and the Plaintiff Class so that the HFT Defendants could then trade against them using the informational asymmetries and other market manipulation detailed herein. *Flash Boys* at 168-72 and 242-43.

6. Defendants utilized devices, contrivances, manipulations and artifices to defraud, which operated as a fraud and deceit on Plaintiffs and the Plaintiff Class in violation of the Securities Exchange Act of 1934 (the "Exchange Act") and SEC rules promulgated thereunder.⁹ Defendants' misconduct rigged the market and manipulated the prices at which shares were traded during the Class Period, causing substantial damage to Plaintiffs and the Plaintiff Class as a result thereof.¹⁰

Defendants' Scheme and Wrongful Course of Business

7. For at least the last five years, various of the Defendants routinely engaged in at least the following manipulative, self-dealing and deceptive conduct:

- "spam and cancel orders" – HFT is all about being first in the order queue, and that has always been HFT's primary alpha. While speed matters, the core HFT alpha can only be realized if the trader knows what order type to send and when to send it. In the early days after the passage of Reg NMS and Rule 610 banning

⁸ Estimates of the commissions paid to all Wall Street banks for stock market trades in 2013 alone range between \$9.3 billion (citing Greenwich Associates) and \$13 billion (citing the Tabb Group). Michael Lewis, *Flash Boys: A Wall Street Revolt* at 208 & footnote (2014) ("*Flash Boys*").

⁹ Those rules include SEC Regulation National Market System ("Reg NMS"), enacted in 2007, which requires that investors receive the best price executions for their bids and orders.

¹⁰ Since the publication of *Flash Boys*, the U.S. Federal Bureau of Investigation ("FBI") and the U.S. Justice Department ("DOJ") have both announced they are investigating high frequency trading. The DOJ is investigating whether the activities violated the federal insider trading prohibitions. Likewise, New York Attorney General Eric Schneiderman (the "NY AG"), the Commodity Futures Trading Commission ("CFTC"), and the SEC are also reportedly probing the unlawfulness of high frequency trading.

locked markets, HFT traders found a way to gain an unfair market advantage by utilizing “spam and cancel” orders developed in collusion with the Exchange participants. The Exchange Participants would commonly price-slide orders rather than cancel them in order to preserve volume on their exchanges, but in order to attract and keep the HFT Defendants as active participants, they needed to develop special order types for the HFT Defendants whereby they could quickly cancel and re-enter orders rather than have them slid, thereby gaining valuable price discovery regarding the order book and achieving queue priority and access to rebates. In many cases, institutions had no idea that their orders were being slid away from the top of the book.

- *“hide and light orders”* – the HFT Defendants use “hide and light” orders as a strategy to avoid the Rule 610 ban on locked markets. Where a regular order would be price-slid back a tick and “lit” at the slid price, these new “hide and light” orders would be priced instead to lock an away market. The hidden price was permitted to lock an away market because it was not a displayed price and thus not considered a Protected Quotation under Reg NMS. Since the name of the game was achieving a superior order queue position, these orders solved the problem by “lighting” the hidden order automatically when the order would no longer result in a violation of Rule 610 when the away market unlocked. These order types give tremendous advantages to the HFT Defendants who are empowered by the Participating Exchanges to use them, especially to the disadvantage of competing institutional orders.
- *“immediate or cancel intermarket sweep orders”* (“ISOs”) were created as a special exception to Rule 611 to allow institutions to sweep through multiple levels of the order book, and are executed without any requirement to check away market pricing or to apply trade-through protections. The HFT Defendants leverage this exception with their speed to get ahead of the slow Stock Information Provider (“SIP”) data feeds relied upon by many in the marketplace for their latest price movement information. Using the “immediate or cancel” (“IOC”) variety of the ISO order, the HFT Defendants regularly instruct exchanges either to immediately execute an order or to cancel it, with no requirement to check if the order trades through any “protected” quotation at an away exchange. By this means, in volatile market conditions, the HFT Defendants gain an unfair advantage by being able to use their speed and ability to use the special IOC ISOs to access rapidly diminishing liquidity and thus out-manuever those dependent on the SIP feed, which often slows down further in fast market conditions.
- *“day ISO orders”* – day ISOs were originally carved out of Rule 610 to provide institutions with a way to sweep a particular offering price level and then bid aggressively at that level for the remainder. Given that such orders enter the market as protected quotations, the HFT Defendants have regularly used day ISOs as an excellent way to step ahead of all orders currently resting on the book at the same price, but which were price-slid or hidden to comply with Rule 610

and the ban on locked markets. The HFT Defendants also knew that they could exploit day ISOs to get ahead of slow SIP feeds while also stepping ahead of “hide and light” orders already on the books. The HFT Defendants thereby regularly jump the queue entirely and use that position to post liquidity at new, aggressive price levels well ahead of traders depending upon latest price information from the slow SIP feeds.

- **“electronic front-running”** – where, in exchange for kickback payments, the HFT Defendants are provided early notice of investors’ intentions to transact by being shown initial bids and offers placed on exchanges and other trading systems by their brokers, and then race those *bona fide* securities investors to the other securities exchanges, transact in the desired securities at better prices, and then go back and transact with the unwitting initial investors to the their financial detriment;
- **“rebate arbitrage”** – where the HFT and Brokerage Firm Defendants obtain kickback payments from the securities exchanges without providing the liquidity that the kickback scheme was purportedly designed to entice;
- **“slow-market (or latency) arbitrage”** – where the HFT Defendants are shown changes in the price of a stock on one exchange, and pick off orders sitting on other exchanges, before those exchanges are able to react and replace their own bid/offer quotes accordingly, which practices are repeated to generate billions of dollars more a year in illicit profits than front-running and rebate arbitrage combined;
- **“spoofing”** – where the HFT Defendants send out orders with corresponding cancellations, often at the opening or closing of the stock market, in order to manipulate the market price of a security and/or induce a particular market reaction;
- **“layering”** – where the HFT Defendants send out waves of false orders intended to give the impression that the market for shares of a particular security at that moment is deep in order to take advantage of the market’s reaction to the layering of orders; and
- **“contemporaneous trading”** – whereby obtaining material, non-public information concerning the trading intentions of Plaintiff and the Plaintiff Class and then transacting against them, Defendants violate the federal securities laws, including §20A of the Exchange Act.

8. Defendants’ wrongful acts and unlawful practices constitute the manipulative use

of devices and contrivances in violation of the Exchange Act and the SEC rules promulgated thereunder and constitute a scheme and wrongful course of business that has operated as a fraud or deceit on investors on U.S.-based exchanges and alternate trading systems for at least the past five years.

The Brokerage Firm Defendants

9. The Brokerage Firm Defendants acted in derogation of the fiduciary duties owed to their customers by failing to obtain for them the best bid and ask prices for their customers. In exchange for hundreds of millions of dollars in rebates and in contravention of applicable law, the payment of which was not disclosed to their customers, the Brokerage Firm Defendants knowingly diverted customer bids and offers to trading systems where the Brokerage Firm Defendants knew those bids and offers would be subjected to manipulative conduct and informational asymmetries that exposed customers to electronic front-running and slow-market arbitrage to the detriment of Plaintiffs and the Plaintiff Class. The Brokerage Firm Defendants engaged in this scheme because the Exchange Participants were paying the Brokerage Firm Defendants kickback payments to drive traffic to particular exchanges and/or because the Brokerage Firm Defendants themselves controlled and (thus profited directly from) the transactions via operating in-house alternate trading systems.

10. Purporting to act as agents and fiduciaries in the handling and execution of the orders to buy and bids to sell stock for clients, the Brokerage Firm Defendants were required by the law, applicable rules and duties to both obtain the best price for their customers and to place their customers' interests ahead of their own when executing their customers' trades. The Brokerage Firm Defendants failed to do so. The Brokerage Firm Defendants' illegal conduct and market manipulation, as alleged herein, violated applicable law and inflicted

substantial harm on Plaintiffs and the Plaintiff Class.

The HFT Defendants

11. Defendants' unlawful practices were designed to and did position the HFT Defendants to identify investors' desire to transact in securities and then enable the HFT Defendants to front-run those same investors in transactions that generated almost riskless profits for the HFT Defendants.¹¹ During the Class Period, some HFT firms had average holding periods of just seconds and some did not report a single losing day of trading over the entire five-year period.

12. The HFT Defendants engaged in the misconduct detailed herein knowing that Plaintiffs and the Plaintiff Class members' orders to buy and sell were not being fulfilled at the best available prices, as required by applicable law and the rules of the SEC and the various stock exchanges, but instead were being manipulated for the benefit of Defendants. Thus, in addition to diverting billions of dollars from Plaintiffs and the Plaintiff Class through predatory order practice, electronic front-running, rebate arbitrage, slow-market arbitrage, spoofing and layering, the HFT Defendants knowingly paid the Exchange Participants and Brokerage Firm Defendants massive sums to create together with the HFT Defendants access to material non-public data as part of the unlawful scheme and wrongful course of business alleged herein.

13. Public investors are entitled to be treated fairly and honestly by brokers and exchanges. Defendants' manipulation of the U.S. securities markets during the Class Period, however, has eroded the investor confidence which is so vital to well-functioning capital markets. In addition to destroying trust in the U.S. capital markets, the misconduct alleged herein has siphoned off billions of dollars from private and public pension funds and individual

¹¹ One HFT firm explained in a Form S-1 filing that it lost money 1 day in 3 years.

retirement accounts that millions of Americans depend upon and severely depleted the traditional market liquidity available through the long-established but now mostly forgotten roles of market-makers and specialists. Defendants' misconduct has deprived these investors of the very "market integrity" the Supreme Court acknowledges all "buyer[s] and seller[s] rely on." Instead, Plaintiff and the Plaintiff Class have been victimized in what can fairly be characterized as "a crooked crap game." *Basic Inc. v. Levinson*, 485 U.S. 224, 247 (1988). As such, Plaintiff, requests the damages and injunctive relief sought herein.

The Exchange Participants

14. Throughout the Class Period, the Exchange Participants: (i) demanded and received exorbitant and commercially unreasonable payments from the HFT Defendants virtually in the form of kickbacks in exchange for agreeing to situate the HFT Defendants' servers on or in close proximity to the Exchange Participants' own order matching servers ("colocation") in order to create informational asymmetries and otherwise rig the market so that the HFT Defendants could profit from incrementally faster access to, and utilization of, material non-public information which, while measured in small fractions of a second, was sufficient with the use of modern technology to create a prohibitively unfair advantage in speed of access to favorable market opportunities over other market participants; (ii) paid hundreds of millions of dollars in kickback payments to the Brokerage Firm Defendants to entice the Brokerage Firm Defendants to direct their customers' bids and offers to exchanges (paying for order flow) where the HFT Defendants would be able to preview this material non-public data before the rest of the market, to the detriment of Plaintiffs and the Plaintiff Class; and (iii) collaborated with the HFT Defendants in designing a large array of special order types to take advantage of anomalies and other special opportunities available at each of the Exchange Participant's markets so that, coupled with the unfair and uncompetitive speed of access available to the HFT Defendants, the

HFT Defendants were able to manipulate order flows, the appearance of liquidity and bid and asked spreads to the economic harm of other market participants who had no access to and in most cases no knowledge of these special order types.

JURISDICTION AND VENUE

15. The claims asserted herein arise under and pursuant to §§10(b) and 20A of the Exchange Act, 15 U.S.C. §§78j(b) and 78t-1, and Rule 10b-5 promulgated thereunder by the SEC (17 C.F.R. §240.10b-5).

16. This Court has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §1331 and §27 of the Exchange Act (15 U.S.C. §78aa). This Court has supplemental jurisdiction of all remaining claims pursuant to 28 U.S.C. §1367.

17. Venue is proper in this District pursuant to §27 of the Exchange Act and 28 U.S.C. §1391(b). Many of the Defendants maintain their principal places of business in this District and many of the acts and practices complained of herein occurred in substantial part in this District.

18. In connection with the acts alleged in this complaint, Defendants, directly or indirectly, used the means and instrumentalities of interstate commerce, including, but not limited to, the mails, interstate telephone communications and the facilities of the national securities markets.

PARTIES

Plaintiffs

19. (a) Plaintiff James J. Flynn (collectively with Plaintiff Morelli the “Plaintiffs”), is an individual with a principal address of 8 Hovenkamp Avenue, Nanuet, New York. As detailed in his Certifications, Plaintiff purchased and/or sold shares of U.S.-based exchange-listed

stock and stock options in trades executed during the Class Period and, as a result thereof, suffered damages from Defendants' unlawful conduct.

(b) Plaintiff Dominic A. Morelli (collectively with Plaintiff Flynn the "Plaintiffs"), is an individual with a principal address of 37 Nimitz Road, Yonkers, New York. As detailed in his Certification, Plaintiff purchased and/or sold shares of U.S.-based exchange-listed stock in trades executed during the Class Period and, as a result thereof, suffered damages from Defendants' unlawful conduct.

The Representative Brokerage Firm Defendants

20. Defendant Bank of America Corporation ("Bank of America") is a financial services company headquartered in Charlotte, North Carolina. On January 1, 2009, Bank of America merged with Merrill Lynch & Co., Inc. ("Merrill Lynch"). Bank of America operates its brokerage activities through its corporate and investment banking division, Bank of America Merrill Lynch, which is headquartered in New York City. After the combination with Merrill Lynch, Bank of America became the largest brokerage in the world. Bank of America's brokerage division placed bids or offers and/or transacted on behalf of the Class on stock exchanges and alternate trading systems during the Class Period. During the Class Period, Bank of America, through its acquisition of Merrill Lynch, also maintained its own proprietary trading divisions or trading desks, funded with \$3 billion in capital as of 2010, which engaged in high frequency trading. During the Class Period, Bank of America's broker-dealer division routed its customer orders for securities listed on the NASDAQ, NYSE Amex or regional exchanges to its own execution system and to those of defendants UBS AG, KCG Holdings, Inc. and Citadel LLC, and/or entities controlled by and/or affiliated with these Defendants. On June 2, 2014, FINRA reported that Bank of America, through the Merrill

Lynch Instinct X ATS, had traded 213,893,755 NMS Tier 1 shares for the week of May 12 through May 18, 2014, the fourth largest aggregate amount of any dark pools reporting, and had traded an additional 5,504,500 NMS Tier 1 shares for the same period through the Merrill Lynch Instinct VWAP Cross ATS.

21. Defendant Barclays PLC (“Barclays”) is a financial services company headquartered in the United Kingdom with offices in New York City. Barclay’s brokerage division placed bids or offers and/or transacted on behalf of the Class on stock exchanges and alternate trading systems during the Class Period. Barclays, through its subsidiary Barclays Capital Inc., which provides securities brokerage services and is headquartered in New York City, operates the alternate trading system Barclays LX. In late 2013, Barclays LX took over as the leading alternate trading system according to published trading volumes. During the Class Period, Barclays also maintained its own proprietary trading divisions or trading desks that engaged in high frequency trading. During the Class Period, Barclay’s brokerage division routed non-directed orders for securities listed on the NASDAQ, NYSE Amex or regional exchanges to its own execution system and those of Defendants NASDAQ, BATS, NYSE, Direct Edge, Credit Suisse Group AG, UBS AG, KCG Holdings, Inc., Citadel LLC and Citigroup Inc. On June 2, 2014, FINRA reported that Barclays’ LX ATS C had traded 305,470,890 NMS Tier 1 shares for the week of May 12 through May 18, 2014, the largest amount of any dark pool reporting.

22. Defendant Citigroup Inc. (“Citigroup”) is a financial services company headquartered in New York City. Citigroup’s brokerage division placed bids or offers and/or transacted on behalf of the Plaintiff Class on stock exchanges and alternate trading systems during the Class Period. Citigroup also operates the alternate trading system CitiMatch. Citigroup, along

with defendants Credit Suisse AG, Fidelity (as defined below) and others, formed eBX LLC as a joint venture in 2004, which operates the alternate trading system Level ATS and was fined \$800,000 by the SEC in 2012 to resolve charges that it failed to protect customers' confidential trading information. Citigroup's unit, Lava Trading, Inc., which is also headquartered in New York City, built the Level ATS alternate trading venue. During the Class Period, Citigroup also maintained its own proprietary trading divisions or trading desks, including its Equity Principal Strategies group, which engaged in high frequency trading. Citigroup owns a total of four ATSs named LavaFlow, LIQUIFI, Citi Credit Cross and Citi Cross. During the Class Period, Citigroup's broker-dealer division routed non-directed customer orders for securities listed on the NASDAQ exchange to its own execution system and to those of at least defendants NYSE and NASDAQ. On June 2, 2014, FINRA reported that Citi Cross alone had traded 57,701,248 NMS Tier 1 shares for the week of May 12 through May 18, 2014, and LavaFlow had traded an additional 152,804,261 NMS Tier 1 shares for the same period. If the financial press had made the connection between LavaFlow and Citi Cross and aggregated the trading, Citigroup would have ended up in fifth place for overall ATS share volume for the week.

23. Defendant Credit Suisse Group AG ("Credit Suisse") is a financial services company headquartered in Zurich, Switzerland with offices in New York City. Credit Suisse's brokerage division placed bids and offers and/or transacted on behalf of the Plaintiff Class on stock exchanges and in alternate trading systems during the Class Period. Credit Suisse also operates what is widely believed to be the largest alternate trading system, Crossfinder. In February 2013, Crossfinder matched 123 million shares a day, or approximately 14% of all trading activity in such systems at the time. During the Class Period, Credit Suisse also

maintained its own New York City-based proprietary and systemic trading divisions or trading desks that engaged in high frequency trading, focusing at times on heavily traded securities. Additionally, Credit Suisse, along with defendants Citigroup, Fidelity and others, formed eBX LLC as a joint venture in 2004, which operates the alternate trading system Level ATS and which was fined \$800,000 by the SEC in 2012 to resolve of charges that it failed to protect customers' confidential trading information. Level ATS accounted for 0.7% of U.S. equities volume, or a daily average of more than 37 million shares, in August 2012. During the Class Period, Credit Suisse's broker-dealer subsidiary routed non-directed orders for securities listed on the NASDAQ, NYSE Amex or regional exchanges to Credit Suisse's own execution system and to those of defendants NYSE, BATS and Direct Edge. On June 2, 2014, FINRA reported that Credit Suisse's Crossfinder ATS had traded 373,550,441 NMS Tier 1 shares for the week of May 12 through May 18, 2014, the largest amount of any dark pool reporting.

24. Defendant Deutsche Bank AG ("Deutsche Bank") is a financial services company headquartered in Frankfurt, Germany with offices in New York City. Deutsche Bank's brokerage division placed bids or offers and/or transacted on behalf of the Plaintiff Class on stock exchanges and alternate trading systems during the Class Period. Deutsche Bank operates the SuperX ATS in the United States. SuperX had a 0.7% market share as of January 2012, with 50.7 million shares matched a day. Deutsche Bank's Autobahn Equity trading business provides access to SuperX through SuperX Plus, Deutsche Bank's alternate trading system aggregator algorithm. During the Class Period, Deutsche Bank also maintained its own proprietary trading divisions or trading desks that engaged in high frequency trading. During the Class Period, Deutsche Bank's broker-dealer subsidiary Deutsche Bank Securities Inc. routed non-directed orders for securities listed on the NASDAQ, NYSE Amex or regional

exchanges to its own execution system and those of defendants Credit Suisse, NYSE, The Goldman Sachs Group, Inc., Direct Edge, NASDAQ, Barclays, UBS AG, BATS, Citigroup, Citadel LLC and KCG Holdings, Inc. On June 2, 2014, FINRA reported that Deutsche Bank's SuperX ATS had traded 188,484,100 NMS Tier 1 shares for the week of May 12 through May 18, 2014, the sixth largest amount of any dark pool reporting.

25. Defendant The Goldman Sachs Group, Inc. ("Goldman Sachs") is a financial services company headquartered in New York City. Goldman Sachs's brokerage division placed bids or offers and/or transacted on behalf of the Plaintiff Class on stock exchanges and alternate trading systems during the Class Period. Goldman Sachs also operates one of the largest alternate trading systems by volume, Sigma X. During the Class Period, Goldman Sachs also maintained its own proprietary trading divisions or trading desks, which at one point generated up to 10% of Goldman Sachs's revenues, which engaged in high frequency trading. During the Class Period, Goldman Sachs received directly or indirectly profits from the execution of its clients' orders through its own execution systems, including Sigma X, and from defendants NASDAQ, NYSE, Direct Edge, BATS or entities controlled by and/or affiliated with these defendants for routing its non-directed equity order flow for securities listed on the NYSE, NASDAQ, NYSE MKT and regional exchanges to systems operated by such defendants and/or entities. On June 2, 2014, FINRA reported that Goldman Sachs' Sigma X ATS had traded 181,758,891 NMS Tier 1 shares for the week of May 12 through May 18, 2014, the seventh largest amount of any dark pool reporting.

26. Defendant JPMorgan Chase & Co. ("JPMorgan") is a financial services company headquartered in New York City. JPMorgan's brokerage division placed bids or offers and/or transacted on behalf of the Plaintiff Class on stock exchanges and alternate trading systems during

the Class Period. JPMorgan offers brokerage services through its U.S. broker dealer affiliates J.P. Morgan Clearing Corp. and J.P. Morgan Securities LLC. During the Class Period, JPMorgan also maintained its own proprietary trading divisions or trading desks that engaged in high frequency trading. During the Class Period, JPMorgan's broker-dealer subsidiary, J.P. Morgan Securities LLC, routed non-directed orders for securities listed on the NASDAQ, NYSE Amex or regional exchanges to its own execution system and to those of defendants NASDAQ and Credit Suisse. On June 2, 2014, FINRA reported that JPMorgan's ATS had traded 112,795,893 NMS Tier 1 shares for the week of May 12 through May 18, 2014, the tenth largest amount of any dark pool reporting.

27. Defendant Morgan Stanley & Co. LLC ("Morgan Stanley") is a financial services company headquartered in New York City. Morgan Stanley's brokerage division transacted on behalf of the Plaintiff Class on stock exchanges and alternate trading systems during the Class Period. Morgan Stanley also operates the alternate trading system MS POOL, which as of May 2009 was crossing on average 100 million shares daily. Morgan Stanley also operates what it calls the "dark liquidity aggregation engine," NightVision, which it says allows users to simultaneously access "fragmented liquidity available at major dark pools." During the Class Period, Morgan Stanley maintained its own proprietary trading divisions or trading desks, including a statistical arbitrage trading desk, which engaged in high frequency trading. During the Class Period, Morgan Stanley's broker-dealer division routed its customer orders for securities listed on the NASDAQ, NYSE Amex or regional exchanges to Morgan Stanley's own execution system and to that of at least defendant Citigroup. As of May 30, 2014, Morgan Stanley was operating three ATSs: MS POOL (ATS-4), MS RETAIL POOL (ATS_6) and MS TRAJECTORY CROSS (ATS-1). On June 2, 2014, FINRA reported that Morgan Stanley's

MS POOL ATS had traded 206,069,300 NMS Tier 1 shares for the week of May 12 through May 18, 2014, the fifth largest amount of any dark pool reporting.

28. Defendant UBS AG (“UBS”) is a financial services company headquartered in Zurich, Switzerland with offices in New York City. UBS’s brokerage division placed bids or offers and/or transacted on behalf of the Plaintiff Class on stock exchanges and alternate trading systems during the Class Period. As of 2008, UBS was trading approximately 690 million shares a day in the United States. UBS operates the alternate trading system UBS ATS in the United States, which is a registered alternate trading system for crossing orders in U.S. equities. UBS ATS’s average daily volume of shares executed in March 2014 was over 166 million. UBS’s technology allows UBS ATS to offer ultra-low latency times for trading, including advanced co-location, high capacity and redundancy technologies. During the Class Period, UBS also maintained its own proprietary trading divisions or trading desks, which earned \$65 million in the fourth quarter of 2011 alone, which engaged in high frequency trading. During the Class Period, UBS’s broker-dealer division routed non-directed customer orders for securities listed on the NASDAQ, NYSE Amex or regional exchanges to its own execution system and to those of at least defendants NYSE and KCG Holdings, Inc. and/or entities controlled by and/or affiliated with these defendants. On June 2, 2014, FINRA reported that UBS’s ATS had traded 278,169,607 NMS Tier 1 shares for the week of May 12 through May 18, 2014, the third largest amount of any dark pool reporting.

29. Defendant The Charles Schwab Corporation (“Schwab”) is a publicly held discount brokerage and financial services company headquartered in San Francisco, California. Schwab manages nearly \$2 trillion in assets for more than 10 million individual investors and institutional clients. It is the second largest discount brokerage, behind only

defendant Fidelity. Schwab placed bids or offers and/or transacted on behalf of the Plaintiff Class on stock exchanges and alternate trading systems during the Class Period. Schwab receives an estimated \$100 million in annual revenues selling its customers' orders to HFT firms to trade against. During the Class Period, Schwab received remuneration such as liquidity or order flow rebates from defendants UBS, Citadel, Citigroup, KCG Holdings, Inc. and Goldman Sachs or entities controlled by and/or affiliated with these defendants, for directing 100% of its non-directed equity order flow for securities listed on the NYSE, NYSE Amex or regional exchanges and the NASDAQ stock market to systems operated by such defendants.

30. Defendant E*TRADE Financial Corporation ("E*TRADE") is a publicly held financial services company founded in 1982 and headquartered in New York City. E*TRADE has more than 2.5 million retail account holders who trade stock over the Internet (the majority of transactions) and by phone. E*TRADE's revenue was \$2.2 billion in 2012. E*TRADE placed bids or offers and/or transacted on behalf of the Plaintiff Class on stock exchanges and alternate trading systems during the Class Period. E*TRADE receives an estimated \$100 million in annual revenues selling its customers' orders to HFT firms to trade against. During the Class Period, E*TRADE received payments from defendants Citigroup, KCG Holdings, Inc., Direct Edge, Citadel LLC or entities controlled by and/or affiliated with these defendants for routing the majority of its orders for securities listed on the NYSE, NASDAQ, NYSE MKT and other national securities exchanges to systems operated by these defendants.

31. Defendant FMR, LLC is a privately held financial services company headquartered in Boston, Massachusetts, and the parent of defendant Fidelity Brokerage Services, LLC (collectively, "Fidelity"). Fidelity provides brokerage and other financial products and services

to more than 20 million individuals, institutions and financial intermediaries. Fidelity has \$3.7 trillion in assets under administration, including managed assets of \$1.6 trillion, as of October 2012. Fidelity's brokerage division placed bids or offers and/or transacted on behalf of member of the Plaintiff Class on stock exchanges and alternate trading systems during the Class Period. Fidelity, along with Credit Suisse, Citigroup, Lehman Brothers and Merrill Lynch, formed eBX LLC as a joint venture in 2004. eBX LLC began to operate the alternate trading system Level ATS in October 2006 and was subsequently fined \$800,000 by the SEC in 2012 to resolve charges that it failed to protect customers' confidential trading information. Level ATS was charged with allowing an outside technology firm Lava Trading, which built and operated Level ATS and was owned by Citigroup, to use data about unexecuted subscriber orders without first notifying the subscribers. During the Class Period, Fidelity received payments from defendants KCG Holdings, Inc., Direct Edge, Citadel LLC, Goldman Sachs and UBS or entities controlled by and/or affiliated with these defendants for routing the majority of its orders for securities listed on the NYSE, NASDAQ, NYSE MKT or regional exchanges to systems operated by these defendants. On June 2, 2014, FINRA reported that Fidelity's Level ATS had traded 59,776,900 NMS Tier 1 shares for the week of May 12 through May 18, 2014.

32. Defendant Scottrade Financial Services, Inc. ("Scottrade"), together with its subsidiaries Scottrade, Inc. and Scottrade Bank, is a privately owned online brokerage headquartered in St. Louis, Missouri. Scottrade allows customers to open accounts with as little as \$500 and has over 500 local branches for in-person assistance, drawing in many "beginner investors." Scottrade placed bids or offers and/or transacted on behalf of the Plaintiff Class on stock exchanges and alternate trading systems during the Class Period. During the Class Period, Scottrade directed 100% of its equity order flow for securities listed on the NASDAQ,

NYSE Amex or regional exchanges to defendants Citigroup, Citadel LLC, UBS, Direct Edge, KCG Holdings, Inc., NASDAQ or entities controlled by and/or affiliated with these defendants.

33. Defendant TD Ameritrade Holding Corporation (“TD Ameritrade”) is a publicly held online broker founded and headquartered in Omaha, Nebraska in 1971. Through several subsidiaries, including TD Ameritrade Clearing, Inc., TD Ameritrade provides electronic discount brokerage and related financial services to investors who trade in, among other things, U.S. stocks. With over 5.8 million clients, TD Ameritrade has more than \$375 billion in client accounts and executes an average of nearly 400,000 trades per day. It is the third largest discount brokerage behind defendants Fidelity and Schwab. TD Ameritrade placed bids or offers and/or transacted on behalf of the Plaintiff Class on stock exchanges and alternate trading systems during the Class Period, and also received payment from certain Defendants. TD Ameritrade brings in an estimated \$227 million in annual revenues selling its customers’ orders to HFT firms to trade against. During the Class Period, TD Ameritrade received payments from defendants Direct Edge, Citadel LLC, UBS, Citigroup or entities controlled by and/or affiliated with these defendants for directing the majority of its non-directed equity order flow for securities listed on the NYSE MKT or regional exchanges and on the NASDAQ OMX Group to systems operated by these defendants.

The Representative HFT Defendants

34. Defendant Citadel LLC (“Citadel”), which engages in some of the most active and profitable HFT activities in the world, is headquartered in Chicago, Illinois and together with its affiliates maintain offices in New York City, London, Hong Kong, Toronto as well as many other locations in the United States. Citadel’s high frequency trading group made \$1.15 billion in

2008. Citadel's \$1.8 billion HFT Tactical Trading fund (as of 2012) earned a 38% return in 2011 while the S&P 500 Index remained flat during the same period. According to an April 11, 2014 Bloomberg article, the Tactical Trading Fund has returned an annualized 26% since the beginning of 2008, with just five losing months, with the worst loss a drop of 1%. On information and belief, the high speed trading in the Fund is now done exclusively in non-equity futures. Citadel's affiliate, Citadel Securities, offers institutional customers through its Citadel Execution Services group a suite of liquidity-seeking, benchmark-based and schedule-based trading algorithms, as well as access to its Apogee ATS, which it describes as "a deep pool of natural retail liquidity." On June 2, 2014, FINRA reported that Citadel Securities' Apogee ATS had traded 30,253,804 NMS Tier 1 shares for the week of May 12 through May 18, 2014.

35. Defendant DRW Holdings, LLC ("DRW") is one of the most active and profitable HFT firms in the world and is headquartered in Chicago, Illinois with offices in New York City and London. According to DRW's website, DRW is a "principal trading organization," meaning that all of its trading is for its "own account and risk," and all of its "methods, systems and applications" are solely for its own use. "Unlike hedge funds, brokerage firms and banks, DRW has no customers, clients, investors or third party funds," and its "trading spans a wide range of asset classes, instruments, geographies and trading systems, with a focus on trading listed, centrally-cleared instruments." "DRW focuses on finding liquid, centrally-cleared futures and futures options, thus eliminating the counterparty exposure associated with OTC/bilateral trading." DRW also consists of DRW Holdings, LLC, a principal trading company and market participant in securities, and DRW Securities, LLC, which provides security brokerage services. An affiliated company, DRW Commodities, LLC, engages primarily in proprietary

trading of natural gas and crude oil futures and options listed on the New York Mercantile Exchange. Donald R. Wilson, Jr. founded DRW Trading Group (DRW) in 1992. He began his trading career as a local in the Eurodollar options pit at the Chicago Mercantile Exchange (CME). In the initial years, DRW focused primarily on exchange-traded fixed-income futures and options. On March 11, 2003, the United States Eighth Circuit Court of Appeals affirmed a CFTC determination that Mr. Wilson had violated the CEA by engaging in wash sales in the wheat futures market. On November 6, 2013, the CFTC brought new charges against Mr. Wilson and DRW Investments, LLC. The CFTC's complaint charged Mr. Wilson and DRW Investments with unlawfully manipulating and attempting to manipulate the price of a futures contract, namely the IDEX USD Three-Month Interest Rate Swap Futures Contract, by a manipulative practice known as "banging the close." The case is currently pending in the Southern District of New York.

36. Defendant GTS Securities, LLC ("GTS") is an HFT firm headquartered in New York City. GTS is an integrated trading and technology firm with an electronic market-making business that accounts for over 3% of daily cash equities volume in the United States. GTS is a trader and arbitrageur in thousands of securities, including U.S. equities. GTS trades as principal via GTS Securities LLC, a CBOE-regulated broker-dealer with memberships on a variety of exchanges. GTS also provides market participants with "microwave network products" through its fully-integrated Strike Technologies division.

37. Defendant Hudson River Trading LLC ("Hudson River") is an HFT firm founded in 2002 and headquartered in New York City with offices in London and Singapore. Hudson River is a quantitative trading and technology company that claims to use advanced mathematical and statistical modeling techniques and an extremely high-performance computing

environment. HRT purports to trade equities, futures, options, currencies and fixed income on over 50 markets worldwide.

38. Defendant Jump Trading, LLC (“Jump”) is an HFT firm headquartered in Chicago, Illinois, with offices in New York City, London and Singapore and is one of the most active and profitable HFT firms in the United States. Jump was founded in 1999 and claims to be at the forefront of algorithmic trading. On April 17, 2014, it was reported that NY AG Eric Schneiderman sent subpoenas to Jump, among other HFT firms, seeking documents related to “trading strategies and whether those strategies are enabled by special deals other trading outfits aren’t privy to.”

39. Defendant KCG Holdings, Inc. (“KCG”) is one of the most active and profitable HFT firms in the United States and is headquartered in Jersey City, New Jersey. KCG is a publicly held company. KCG was formed through a merger between HFT firms Getco LLC and Knight Capital Group in 2013. By August 2012, Knight Capital had evolved to become one of the largest traders of U.S. stocks, accounting for 17% of all trading volume in the NYSE-listed stocks, and about 16% in NASDAQ listings among securities firms. By 2012, Getco had evolved to become the most active, most profitable, and likely the fastest, HFT firm. KCG now operates two ATSS through KCG Americas LLC, GETMatched and Knight Match. KCG also offers various algorithmic services to its clients, including Knight Direct and GETAlpha suites of execution algorithms and the Knight Direct EMS for clients who want to control their access to the markets with superior algorithmic tools. On information and belief, KCG generated approximately \$1 billion in profits between 2008 and 2013. On June 2, 2014, FINRA reported that KCG’s Knight Match ATS had traded 133,909,078 NMS Tier 1 shares for the week of May 12 through May 18, 2014, and KCG’s GETMatched ATS had traded an additional 64,169,352 NMS Tier 1

shares for the same period. If the financial press had made the connection between Knight Match and GETMatched and aggregated the trading, KCG would have ended up in sixth instead of ninth place for overall ATS share volume for the week.

40. Defendant Quantlab Financial LLC (“Quantlab”) is an HFT firm founded in 1998 and headquartered in Houston, Texas. Quantlab operates as a subsidiary of The Quantlab Group, which, through Quantlab, develops and deploys electronic trading systems. According to its website, Quantlab is a “technology-driven firm supporting a large-scale quantitative trading operation” and has “a track record of consistent profitability under varying market conditions.” Quantlab accounts for up to 3% of the daily U.S. stock market volume.

41. Defendant Tower Research Capital LLC (“Tower”) is an HFT firm headquartered in New York City and founded in 1998 by former Credit Suisse trader Mark Gorton. Tower focuses on “quantitative trading and investment strategies” and “automated equity trading.” Tower trades through its affiliate Lime Brokerage LLC, a provider of high-speed trading services to other HFT firms (including co-location services, proximity hosting, market data feeds and a proprietary trading server), that is accountable for up to 5% of the U.S. equity trading volume. According to Tower’s website, Tower “develops proprietary trading algorithms by using rigorous statistical methodology to identify non-random patterns in the behavior of markets” and “[e]xploiting these inefficiencies allows the firm to earn exceptional returns while mitigating risk.” As of 2008, Tower never had a losing year of trading. On April 17, 2014, it was reported that NY AG Eric Schneiderman sent subpoenas to Tower, among other HFT firms, seeking documents related to “trading strategies and whether those strategies are enabled by special deals other trading outfits aren’t privy to.”

42. Defendant Tradebot Systems, Inc. (“Tradebot”) is one of the most active and profitable HFT firms and is headquartered in Kansas City, Missouri. Tradebot was started by defendant BATS founder David Cummings, who stated in 2008 that the company typically held stocks for 11 seconds and that Tradebot had not had a losing day of trading in 4 years. Cummings is also widely recognized as inventing the concept of co-location in the mid-2000s, where HFT firms pay for being placed in close proximity to an exchange’s matching engine thereby shaving crucial milliseconds from the time it takes to complete a trade. Tradebot’s website brags that “[t]he market can be beaten,” that the company “love[s] the game,” and that “[t]echnology is [its] weapon.” Tradebot also prides itself on “mak[ing] millions of *small* trades.” In May 2012, it was reported that Tradebot was one of the world’s two most active HFT firms, trading as many as one billion shares a day in U.S. equities.

43. Defendant Tradeworx Inc. (“Tradeworx”) is an HFT firm headquartered in Red Bank, New Jersey. Tradeworx was founded in 1999 by Manoj Narang, an outspoken industry proponent of HFT. Tradeworx operates an equity market neutral hedge fund (meaning its strategy is to make money regardless of which direction the market turns) and a high frequency proprietary trading business. Tradeworx licenses its trading platform through its affiliate, Thesys Technologies, to other HFT firms. By the end of 2009, Tradeworx claimed to be trading some 80 million shares per day in U.S. equities.

44. Defendant Virtu Financial Inc. (“Virtu”) is one of the most active and profitable HFT firms and is headquartered in New York City. Virtu was founded in 2008 and its U.S. equities trading income had grown to \$111.1 million by 2013. Virtu provides quotes in more than 10,000 securities and contracts on more than 210 systems in 30 countries. Virtu claims on its website that: “Our expertise in the financial markets and our unique technical abilities

have allowed us to work directly with several established firms on a number of exciting projects, and we are able to provide customized liquidity solutions across the full spectrum of asset classes. Virtu's efficiencies and experience create a win/win situation for us and our market making counterparties." Virtu tried but failed to buy Knight Capital Group in 2012. On March 10, 2014, Virtu filed for an initial public offering and disclosed that it had just one day of trading losses in 1,238 days. It is seeking a valuation of \$3 billion, twice as much as defendant KCG. Two days after Lewis released *Flash Boys*, Virtu withdrew its IPO.

45. Defendant Chopper Trading, LLC ("Chopper") is a proprietary HFT firm founded in 2002 and based in Chicago, Illinois, with satellite offices in New York, London, San Francisco and Washington D.C. Chopper trades in equities, among other markets, and on "virtually every major domestic exchange," including defendant NYSE. On April 17, 2014, it was reported that NY AG Eric Schneiderman sent subpoenas to Chopper, among other HFT firms, seeking documents related to "trading strategies and whether those strategies are enabled by special deals other trading outfits aren't privy to."

46. Defendant BIDS Trading, L.P. ("BIDS") was incorporated in 2006 and is based in New York City, and operates as a subsidiary of BIDS Holdings, L.P. ("BIDS Holdings"). BIDS Holdings was set up as a joint venture of Bank of America, Citigroup, Credit Suisse, Deutsche Bank, Goldman Sachs, JPMorgan, Knight Capital, Lehman Brothers, Merrill Lynch, Morgan Stanley, NYSE Euronext and UBS. BIDS is a registered broker-dealer, and operates the BIDS ATS that allows buy-side and sell-side firms to trade various blocks of shares. It also provides order protection tools that include BIDS Scorecards and Filters, which facilitate traders to control over their trades by letting them decide to whom they want to disclose information. On July 22, 2011, BIDS announced that on the previous day the ATS had

executed a single day trading record of over 100 million shares. On February 3, 2014, BIDS announced record block trading volumes for the month of January of more than 32 million shares, which was up 88% year over year. On June 2, 2014, FINRA reported that BIDS had traded 96,577,440 NMS Tier 1 shares for the week of May 12 through May 18, 2014.

The Exchange Participants

47. As of the filing of this Complaint, the following sixteen “national securities exchanges” are registered with the SEC under §6 of the Exchange Act.

48. Exchange Participant BATS Global Markets, Inc. (“BATS”), along with its operating subsidiaries BATS BZX Exchange, Inc. and BATS BYX Exchange, Inc., is an electronic stock exchange based in Lenexa, Kansas. BATS was founded in June 2005 as an Electronic Communication Network (“ECN”) and its name stands for Better Alternative Trading System. BATS operates two stock exchanges in the United States, the BZX Exchange and the BYX Exchange, which currently have daily trading volumes of approximately 630 million and 200 million shares, respectively, which account for approximately 8.5% and 2.7%, respectfully, of U.S. equity daily trading volume. BATS competes with Direct Edge ECN, LLC to be the third largest stock market in the United States, behind the NYSE and NASDAQ.

49. Exchange Participant BOX Options Exchange LLC (“BOX”) is an all-electronic equity options market that is jointly owned by the TMX Group and seven broker dealers. BOX launched trading in February 2004 as an alternative to the then-existing market models. BOX states it has 1,500 option classes available for trading.

50. Exchange Participant Chicago Board Options Exchange, Inc. (“CBOE”) is one of the largest U.S. options exchanges and is based in Chicago, Illinois. CBOE offers options on

tens of hundreds of companies, scores of stock indices, and more than 100 exchange-traded funds. The Chicago Board of Trade established the CBOE in 1973. The first exchange to list standardized, exchange- traded stock options began its first day of trading on April 26, 1973, in a celebration of the 125th birthday of the Chicago Board of Trade. The CBOE is a national securities exchange and self- regulated organization, which operates under the oversight of the SEC.

51. Exchange Participant Chicago Stock Exchange, Inc. (“CHX”) is a public stock exchange headquartered in Chicago, Illinois. The CHX is a national securities exchange and self-regulated organization, which operates under the oversight of the SEC. The CHX is the third most active stock exchange in the United States by volume, and the largest outside New York City.

52. Exchange Participant C2 Options Exchange, Inc. (“C2”) is another public exchange owned by CBOE Holdings, Inc. C2 operates under a separate exchange license, employing a market model it says “provides a maker-taker fee schedule and a modified price-time matching algorithm for multiply-listed classes.”

53. Exchange Participant Direct Edge ECN, LLC (“Direct Edge”) is a Jersey City, New Jersey-based electronic stock exchange operating through two separate trading exchanges, EDGX Exchange and EDGA Exchange, which trade on average more than 500 million and more than 200 million shares, respectively, and account for approximately 7% and 3%, respectively, of all U.S. daily equity trading volume. Direct Edge competes with BATS to be the third largest stock market in the United States, behind the NYSE and NASDAQ. EDGX utilizes a so-called maker/taker pricing model offering high rebates for those who place bids and offers and charging those who merely fill orders. EDGA is a low cost exchange with a

taker/maker pricing model as well.

54. Exchange Participant International Securities Exchange Holdings, Inc. (“ISE”) is a wholly owned subsidiary of German derivatives exchange Eurex, which is owned by Deutsche Börse AG, which operates two U.S. options exchanges, ISE and ISE Gemini. Founded in 2000 and headquartered in New York City, ISE is a leading U.S. equity options exchange. In August 2008, ISE announced a partnership with Direct Edge, making the ISE a wholly owned subsidiary of Direct Edge and giving ISE an ownership stake in Direct Edge.

55. Exchange Participant The NASDAQ Stock Market LLC (“NASDAQ”), is a New York City- based electronic stock exchange. In 1971, NASDAQ stood for National Association of Securities Dealers Automated Quotations. NASDAQ was founded in 1971 by the National Association of Securities Dealers (“NASD”), who divested themselves of it in a series of sales in 2000 and 2001. NASDAQ is now owned and operated by the New York City- based NASDAQ OMX Group, which also owns the OMX stock market network. It is regulated by the Financial Industry Regulatory Authority (“FINRA”), the successor to the NASD. The NASDAQ is the second largest stock exchange in the world by market capitalization, after the NYSE. The NASDAQ typically trades in excess of 1.3 billion shares daily, and accounts for just less than 20% of all U.S. equity trading on a daily basis.

56. Exchange Participant NASDAQ OMX BX, Inc. (“BX”) (formerly the Boston Stock Exchange) is one of the many stock exchanges owned and operated by the NASDAQ OMX Group. It focuses on nationally listed securities. The BX typically trades an average of 220 million shares on an average daily basis, and accounts for approximately 3% of all daily U.S. equity trading volume.

57. Exchange Participant NASDAQ OMX PHLX, LLC (“PHLX”) (formerly the

Philadelphia Stock Exchange) is another one of the many stock exchanges owned and operated by the NASDAQ OMX Group. Launched in 2010, the PHLX typically trades approximately 42 million shares per day, and accounts for approximately 0.6% of all U.S. equity trading on a daily basis.

58. Exchange Participant National Stock Exchange, Inc. (“NSX”) is an electronic stock exchange based in Jersey City, New Jersey. NSX was founded March 1885 in Cincinnati, Ohio, as the Cincinnati Stock Exchange. In 1976, it closed its physical trading floor and became an all-electronic stock market. The Cincinnati Stock Exchange moved its headquarters to Chicago in 1995, and changed its name to the National Stock Exchange on November 7, 2003. Owned by its members since inception, it demutualized in 2006. It later moved its headquarters to Jersey City, New Jersey. In September 2011, CBOE entered into an agreement to acquire the NSX. The acquisition was completed on December 30, 2011, with both exchanges continuing to operate under separate names.

59. Exchange Participant New York Stock Exchange, LLC (“NYSE”) is a stock exchange headquartered in New York City. The NYSE is operated by NYSE Euronext, which was formed by the NYSE’s 2007 merger with the fully electronic stock exchange Euronext. In December 2012, it was announced that the NYSE was being sold to Intercontinental Exchange (“ICE”), a futures exchange headquartered in Atlanta, Georgia, for \$8 billion. NYSE and Euronext now operate as divisions at ICE. The NYSE is by far the world’s largest stock exchange by market capitalization, with its listed companies accounting for more than \$16 trillion as of May 2013. Average daily trading value was approximately \$169 billion in 2013. The NYSE has been the subject of several lawsuits alleging fraud and breach of duty in

connection with its exchange trading practices.¹²

60. Exchange Participant NYSE Arca, Inc. (“ARCA”) is headquartered in Chicago, Illinois. Previously known as ArcaEx, an abbreviation of Archipelago Exchange, it is a securities exchange on which both stocks and options are traded. It is owned by NYSE Euronext, which merged (as NYSE Group) with Archipelago Holdings in a reverse merger on February 27, 2006.

61. Exchange Participant OneChicago, LLC (“OneChicago”) is an all-electronic exchange owned jointly by IB Exchange Group (“IB”), CBOE, and CME Group. It is a privately held company that is regulated by both the SEC and the CFTC. OneChicago’s corporate headquarters are located in the Chicago Board of Trade Building. OneChicago offers thousands of single-stock futures (“SSF”) products with names such as IBM, Apple and Google. OneChicago currently operates the only U.S.- based securities futures marketplace.

CLASS ACTION ALLEGATIONS

Plaintiff Class Allegations

62. Plaintiffs bring this class action pursuant to Federal Rule of Civil Procedure 23 on behalf of all public investors who purchased and/or sold shares of stock or stock options listed on a U.S.-based exchange or alternate trading system between April 18, 2009 and the present and were injured thereby (the “Plaintiff Class”). Excluded from the Plaintiff Class are Defendants, any officer, director, partner or owner of any of the Defendants, members of their

¹² For example, in 2003, the California Public Employees’ Retirement System (“CalPERS”), the largest U.S. pension fund, sued the NYSE and seven specialist firms alleging they manipulated the trading system to profit at the expense of investors. CalPERS alleged that the specialists, who match buyers and sellers, used their knowledge of pending orders to unlawfully trade for their own accounts, by, among other things, interpositioning between trades when it was not necessary and that the NYSE not only knew these practices existed, but perpetuated and profited therefrom.

immediate families and their legal representatives, heirs, successors or assigns and any entity in which Defendants have or had a controlling interest.

63. The members of the Plaintiff Class are so numerous that joinder of all members is impracticable. While the exact number of Plaintiff Class members is unknown to Plaintiffs and can only be ascertained through proper discovery, Plaintiffs believe there are hundreds of thousands of members in the proposed Plaintiff Class.

64. Plaintiffs' claims are typical of the claims of the members of Plaintiff Class as all members of the Plaintiff Class are similarly affected by Defendants' wrongful conduct that is complained of herein.

65. Plaintiffs will fairly and adequately protect the interests of the members of the Plaintiff Class and have retained counsel competent and experienced in class actions and securities litigation.

66. In addition, the conduct of Defendants has been and continues to be of such a nature, as alleged herein, on grounds generally applicable to all members of the Plaintiff Class, thereby making appropriate final injunctive relief as sought and described more fully herein on a Classwide basis.

67. Common questions of law and fact exist as to all members of the Plaintiff Class and predominate over any questions solely affecting individual members of the Plaintiff Class. Among the common questions of law and fact are:

(a) whether Defendants implemented the manipulative acts, devices or contrivances or engaged in the alleged fraudulent scheme and course of business alleged herein;

- (b) whether the Exchange Act and SEC rules were violated by Defendants' conduct alleged herein;
- (c) whether the Defendants acted knowingly or recklessly in connection with the misconduct alleged herein;
- (d) whether the Brokerage Firm Defendants and HFT Defendants engaged in contemporaneous trading as prohibited by the Exchange Act;
- (e) whether the trading prices of shares and stock options purchased and sold during the Class Period were distorted by Defendants' conduct;
- (f) whether the HFT Defendants engaged in certain preferential and predatory order practices with the knowing participation and assistance of the Brokerage Firm Defendants and Stock Market Participants that caused direct economic loss to the Plaintiff Class;
- (g) whether and what equitable relief should be granted to Plaintiffs and the Plaintiff Class; and
- (h) the extent of damages sustained by members of the Plaintiff Class and the appropriate measure of damages.

68. A class action is superior to other available methods for the fair and efficient adjudication of this controversy since joinder of all members of the Plaintiff Class is impracticable. Further, as the damages suffered by most individual members of the Plaintiff Class may be relatively small, the expense and burden of individual litigation make it virtually impossible for most members of the Plaintiff Class to redress the wrongs done to them individually. The Plaintiff Class is readily definable, and prosecution of this action as a class action will reduce the possibility of repetitious litigation and different treatment of different

Defendants for the same misconduct and damages. There will be no significant difficulties in managing this action as a class action. If the Court decides that those investors who traded in stock options during the Class Period have claims that differ significantly from those investors who traded in shares so as to be properly treated as a separate class, then it will be a simple matter under Rule 23 to create an appropriate sub-class to address the claims of stock option traders.

Defendant Class Allegations

The Brokerage Firm Defendants and HFT Defendants identified in ¶¶20-46 herein are sued both individually and as representatives of a defendant class (the “Defendant Class”) consisting of all financial firms whose brokerage divisions placed bids or offers and/or transacted for members of the Plaintiff Class on stock exchanges and/or alternate trading systems during the Class Period; financial firms that operated alternate trading systems which provided systems for the anonymous placing of bids and offers and trading by brokers to the members of the Plaintiff Class during the Class Period; and financial firms that engaged in high frequency trading during the Class Period.

69. Plaintiffs allege, based on information and belief, that there are hundreds of members of the Defendant Class. The members of the Defendant Class are so numerous and geographically dispersed that joinder of all such Defendant Class members is impracticable.

70. There are questions of law or fact common to the Defendant Class that predominate over any questions affecting only individual members. These common questions include whether members of the Defendant Class:

- (a) engaged in “spam and cancel” orders purposefully to defeat the investor protections intended by the enactment of Reg NMS;
- (b) engaged in “hide and light” orders purposefully to defeat the investor

- protections intended by the enactment of Reg NMS;
- (c) engaged in “immediate or cancel” “intermarket sweep” orders purposefully to defeat the investor protections intended by the enactment of Reg NMS;
- (d) engaged in day “intermarket sweep” orders purposefully to defeat the investor protections intended by the enactment of Reg NMS;
- (e) engaged in electronic front-running;
- (f) engaged in rebate arbitrage;
- (g) engaged in slow-market arbitrage;
- (h) engaged in spoofing;
- (i) engaged in layering;
- (j) engaged in contemporaneous trading in violation of the federal securities laws;
- (k) directed the trades of the Plaintiff Class to exchanges or ATSs based on their own pecuniary interest rather than in the interest of obtaining the best price for the members of the Plaintiff Class;
- (l) accepted payments, commissions or rebates in connection with directing trades to exchanges that incentivized them to seek other than the best price for their customers;
- (m) violated the Exchange Act;
- (n) violated SEC rules and regulations;
- (o) violated the public exchanges’ rules and regulations; and
- (p) the measure by which damages may be determined in connection with

the Defendant Class's violations of the Exchange Act and SEC rules.

71. The defenses of the Brokerage Firm Defendants and the HFT Defendants to the claims of Plaintiffs and the Plaintiff Class are typical of the defenses of the other members of the Defendant Class to such claims. It is expected that the Brokerage Firm Defendants and the HFT Defendants named herein will retain competent and experienced counsel in defense of this litigation, and will fairly and adequately protect the interests of the Defendant Class.

72. A class action against the Defendant Class is superior to other available methods for the fair and efficient adjudication of this controversy. The certification of a Defendant Class in connection with the wrongs alleged herein will not present any unusual difficulties or burdens. Absent certification of a Defendant Class there exists the possibility of a multiplicity of actions, the risk of inconsistent determinations, and the risk of inconsistent standards to which the individual members of the Defendant Class may be held, including any equitable or injunctive relief this Court may grant.

SUBSTANTIVE ALLEGATIONS

BACKGROUND

The Recent Evolution of U.S.-Based Public Stock Markets

73. In 1972, the U.S. market for securities was already quite fragmented. The same stock often traded at different prices at different trading systems, and the NYSE ticker tape did not report transactions of NYSE-listed stocks that took place on regional exchanges or on other over-the-counter securities markets. This fragmentation made it difficult for traders to comparison shop.

74. In 1975, Congress authorized the SEC to facilitate a national market system to ensure that securities listed on registered exchanges traded at the same or similar prices across all public exchanges. One of the objectives of creating a national market system was the

linking of all markets for qualified securities through communication and data processing facilities, facilitating simultaneous quoting from all exchanges and allowing investors to obtain the best price. Section 11A of the Exchange Act enacted in 1975 provides for the establishment of the national market system for securities.

75. A national market system plan (or “NMS plan”) is a structured method of transmitting securities transactions in real-time. In the United States, national market systems are governed by §11A of the Exchange Act and SEC Rule 11(a)(1). In addition to processing the transactions themselves, these plans also emit the price and volume data for these transactions. Information on each securities trade is sent to a central network at the Securities Industry Automation Corporation (“SIAC”) where it is consolidated with other trades on the same “tape” and then distributed. There are three major tapes in the United States: Tape A and Tape B (the “Consolidated Tape,” which contains all NYSE and regional exchange trades) and Tape C (which contains all NASDAQ trades).

76. During the early 2000s, U.S. stock regulators became worried that the U.S. markets were falling behind financial centers such as London, Frankfurt and Hong Kong, which were embracing electronic trading systems. SEC officials worried that control of U.S. capital markets could begin to shift offshore if the U.S. system did not evolve. In 2005, the rules promulgating the national market system were consolidated into Reg NMS, which went into effect in 2007. The purpose of Reg NMS ensured that – as required by §11A of the Exchange Act – orders were always carried out at the best price available. Some of the more notable Reg NMS rules included:

- ***Order Protection (or Trade-Through) Rule*** – providing intermarket price priority for quotations that are immediately and automatically accessible (Rule 611).

- ***Access Rule*** – addressing access to market data such as quotations and forbidding locked or crossed markets in protected quotations (Rule 610).
- ***Sub-Penny Rule*** – establishing minimum pricing increments (Rule 612).
- ***Market Data Rules:***
 - a) Allocation amendment – instituting a new Market Data Revenue Allocation Formula;
 - b) Governance amendment – creating advisory committees; and
 - c) Distribution and Display Rules – governing market data (Rule 600, 601 and 603).

77. In explaining the purpose of Reg NMS, the SEC reiterated that “the NMS [was] designed to achieve the objectives of efficient, competitive, *fair*, and orderly *markets that are in the public interest and protect investors.*” The SEC also stated that in connection with enacting the Order Protection Rule, its primary purpose was to provide “strengthened assurance that *orders will be filled at the best prices,*” and to provide investors “*greater confidence that they will be treated fairly when they participate in the equity markets.*” The SEC went on to emphasize that “*[m]aintaining investor confidence is an essential element of well-functioning equity markets.*” Noting that the public comment portion of the rulemaking process highlighted the divergent interests of short-term traders and long-term investors, the SEC emphatically stated that Reg NMS was being structured to favor the interests of long-term investors over short-term traders, stating in pertinent part as follows:

Noting that any protection against trade-throughs could interfere to some extent with such short-term trading strategies, the release framed the Commission’s policy choice as follows: “Should the overall efficiency of the NMS defer to the needs of professional traders, many of whom rarely intend to hold a position overnight? Or should the NMS serve the needs of longer-term investors, both large and small, that will benefit substantially from intermarket price protection?” *The Reproposing Release emphasized that the NMS must meet*

the needs of longer-term investors, noting that any other outcome would be contrary to the Exchange Act and its objectives of promoting fair and efficient markets that serve the public interest.

The SEC also emphasized how protecting long-term investors over short-term traders satisfied its regulatory mandate to protect “investors,” emphasizing that “it makes little sense to refer to someone as ‘investing’ in a company for a few seconds, minutes, or hours,” so “when the interests of long- term investors and short-term traders conflict . . . , the Commission believes that” it is the SEC’s “clear responsibility . . . to uphold the interests of long-term investors.”

78. As enacted, Reg NMS required that exchanges and brokers accept the most competitive bid or offer prices posted at any U.S. trading system that displayed price quotes, so as to speed up the stock market and ensure that investors got the best prices. For stock exchanges, Reg NMS made it important that they be able to display the national best bid and offer prices, and having a heavy flow of orders could increase the perception that the exchange was offering the best prices. In order to obtain robust order flow, exchanges began to offer incentives to trading firms whose business was to constantly buy and sell stocks – firms known as “market makers.” These incentives took the form of rebates paid to traders (including brokers) to offer to sell or buy securities on those exchanges.

79. Meanwhile, exchanges charged fees to investors who sought to merely accept the prices the market makers quoted. Reg NMS cemented this pricing practice by allowing exchanges to continue charging such fees to so-called “takers,” while not charging so-called “makers.” But for the market-making firms, as they constantly placed bids and offers for securities, *the stock exchanges’ frequently shifting schemes of rebates and discounts created another arbitrage opportunity.* With more than a dozen U.S. stock exchanges and around 50 private stock-trading systems, this provision of Reg NMS added additional complexity to the

financial markets – leading to rebate arbitrage (where traders decide which exchange to trade on based on the rebate paid to them for doing so).

80. Following the adoption of Reg NMS, it became more valuable for a trading platform to qualify as a full-fledged stock exchange because if an exchange displayed the best price for a stock, then that was where an order for the stock had to be filled (providing market flow and the related financial incentives). The same was not true of other types of trading platforms, some of which do not publicly display price quotes. For instance, in 2008 defendant BATS converted its electronic trading platform to a full-fledged public exchange registered with the SEC in order to capture new trading business precipitated by the new Reg NMS rules. Defendant Direct Edge followed suit in 2010. In addition, established exchanges such as NASDAQ bought up fading exchanges that once represented regional markets in Philadelphia, Boston and Cincinnati, reestablishing them as electronic platforms geared toward specific niches. From 2007 to 2011, seven new stock exchanges opened for business.

81. Reg NMS also spurred the proliferation of alternate electronic trading systems that do not publicly display bid and offer prices and allowed for anonymous trading (sometimes referred to as “dark pools”). The fees public stock exchanges charge to access their prices gave brokers added incentive to direct stock orders toward these and other private trading platforms, where trading is often cheaper.

82. The new structure spawned by Reg NMS also ramped up cat-and-mouse games played by sophisticated traders operating in the stock market. Computerized HFT firms tried to obtain clues about what Plaintiff Class members, in particular big institutional investors, were planning to trade through techniques such as repeatedly placing and instantly canceling thousands of stock orders to detect demand (referred to colloquially as “pinging”).

If such an HFT firm's algorithms detected that a Plaintiff Class member was planning to purchase or sell a certain stock, the HFT firm's computers would conclude the stock was worth more (or less) than the public quote and would rush to buy (or sell) it first. That process made purchases or sales costlier for Plaintiff Class members.

83. Financial institutions that make large stock purchases have long been accustomed to breaking up their orders to avoid tipping off the market. But because buy and sell orders were being bounced around so widely following the enactment of Reg NMS, it became easier for HFT firms' algorithms to detect what and how much Plaintiff Class members were planning to trade – including their price sensitivity and margin requirements – based on knowing each investors' historical practices. For instance, as an Illinois appellate court found in February 2010 in a decision involving defendant HFT firm Citadel's claim to intellectual property rights over its proprietary HFT information gathering systems:

High frequency trading . . . requires the development of a vast collection of historical market data. Citadel has been gathering market data since it began the high frequency business, which was built on the foundation of Citadel's prior quantitative investment work. *The data system contains the rough equivalent of approximately 100 times the amount of data included in the Library of Congress.* In order to use the historical market data, codes and programs must be written to *translate, organize and replay it*. This process involves writing code to review and organize the data into a coherent and usable format. *Market data replayers allow a particular signal or "alpha" to be tested over historical market data.* Citadel developed these tools in building its high frequency business. A combination of signals or "alphas" may be used in a trading strategy.

Moreover, Citadel built trading engines that read incoming real-time market data and, when the opportunity arises, execute its trading strategies and alphas to buy and sell securities. This is a critical piece of the infrastructure and of the entire interrelated network.¹³

(Footnote omitted.)

¹³ *Citadel Investment Group, LLC v. Teza Technologies LLC*, 924 N.E. 2d 95, 97-98 & n.1 (Ill. 2010) ("Signals or 'alphas' are mathematical price prediction algorithms or models developed and tested by Citadel.").

84. Reg NMS further mandated that each of the millions of buy and sell orders issued around the world for U.S.-listed stocks must scan the Chicago Stock Exchange's computers before they could be completed, though that exchange has long been largely dormant and presently accounts for just 0.5% of shares that change hands nationally. This created what has been characterized as "a spaghetti-bowl of data streams and connections between brokers and trading platforms that grew out of Regulation NMS."¹⁴

85. "Latency" is the time between the moment a signal to buy or sell a share is sent from a broker and when it is received by one of the 16 public stock exchanges identified herein at ¶¶48-61. Several factors determine the latency of a trading system, including the boxes, the logic and the lines the broker uses to transmit the order, and whether the order is first sent to a public stock exchange or to an alternate trading system. The boxes are the machinery through which the signals pass on their way from Point A to Point B, *i.e.*, the computer servers and signal amplifiers and switches. The logic is the software, the code instructions that operate the boxes. The lines used to be just the glass fiber-optic cables that carry the information from one box to another. The single biggest determinant of speed used to be the length of the fiber, or the distance the signal needs to travel. To expedite transmission, some firms now transmit data between Chicago and New Jersey via microwave signals sent from tower to tower as well.

86. In this bold new world, stock exchanges now make fees in several ways:

- Traders pay a small fee per 100 shares when they move shares – according to the *Associated Press*, the exchanges make approximately three-hundredths of a penny for every 100-stock order;
- Financial researchers, news companies and HFT firms pay exchanges

¹⁴ See Jacob Bunge, *A Suspect Emerges in Stock-Trade Hiccups: Regulation NMS – Some Say Increasing Complexity of Market Partly Due to Set of Rules*, Wall St. J., Jan. 27, 2014.

for access to trade data – who sold what, when, and for how much;

- Traders purchase special trading software from exchanges; and
- HFT firms pay exchanges for the right to install their computer servers as close as possible to the actual exchange, so that their electronic trade requests will arrive milliseconds earlier than their competitors' requests.

High Frequency Trading

87. High frequency trading is a type of algorithmic trading, specifically the use of sophisticated technological tools and computer algorithms to trade securities extremely rapidly. HFT uses proprietary trading strategies carried out by computers to move in and out of positions in fractions of a second. As of 2009, studies suggested HFT trading accounted for 60%-73% of all U.S. equity trading volume. By value, actual high frequency trading was estimated in 2010 by consultancy Tabb Group to make up just **56%** of equity *trades* in the United States. Financial services firms that engage in proprietary HFT on their own firms' accounts sometimes also engage in trading for their customers' accounts. Indeed, many of the nation's largest financial institutions, including all of the HFT Defendants identified herein at ¶¶34-46, and the Brokerage Firm Defendants identified herein at ¶¶20-33, have in-house high frequency trading divisions under their umbrellas. High frequency trading is proprietary trading done on the firm's own account though, not trading done on behalf of that firm's customers. Financial services firms earn profits *off the market* when they engage in proprietary, high frequency trading against other market participants, whereas they earn commissions *for trading* on the accounts of their customers *on the market*.

88. High frequency trading has grown exponentially since its inception in 1999 following the SEC's authorization of electronic exchanges in 1998. At the turn of the 21st century, HFT trades had an execution time of several seconds, whereas by 2010 this had decreased to

milli- and even microseconds.¹⁵

89. In the early 2000s, high frequency trading accounted for fewer than 10% of equity orders, but according to data provided by the NYSE, overall trading volume grew by about 164% between 2005 and 2009, a material portion of which can be attributed to high frequency trading. Proponents of permitting high frequency trading claim HFT firms are market-makers and provide liquidity to the market which lowers volatility and helps narrow bid-offer spreads, making trading and investing cheaper for other market participants. In the United States, dedicated HFT firms represent 2% of the approximately 20,000 firms operating today, *yet account for 73% of all equity bids and orders volume*. The largest high frequency trading firms in the United States include members of the Defendant Class such as the HFT Defendants identified herein at ¶¶34-46.

90. High frequency traders move in and out of positions very quickly, aiming to capture sometimes just a fraction of a cent in profit on every trade – providing very low margins. But HFT firms do not employ significant leverage, accumulate positions or hold their portfolios for minutes – much less overnight. As a result, HFT has a potential Sharpe ratio (a measure of risk and reward) thousands of times higher than traditional buy-and-hold strategies. HFT firms make up for their low margins with incredibly high volumes of trading, frequently numbering in the millions.

91. However, HFT firms execute on very few of the bids and orders they place on stock exchanges and alternate trading systems, often placing those bids and orders for only

¹⁵ A millisecond is one thousandth of a second; a microsecond is one millionth of a second. By way of comparison, one millisecond is to one second as one second is to 16.67 minutes and one microsecond is to one second as one second is to 11.574 days. Estimates of the time it takes to blink your eye range from 100 millisecond (100,000 microsecond) to 400 millisecond (400,000 microsecond) – just a mere fraction of a second.

seconds to discover the intentions of other traders. In 1999, there were 1,000 quotes per second, streaming from U.S. stock exchanges and approximately two billion shares traded each day. Today, there are two million quotes per second, but the market trades just over five billion shares per day, which is just over twice the volume of stock traded, but 2,000 times more quotes. These quotes are essentially HFTs at war with each other, to the detriment of the investing public.¹⁶ “In other words, the HFTs generate a crushing, expensive amount of information (data) that don’t need to be sent to millions of computers around the world,” and “[t]hey spend a vast majority of their time spoofing, or trying to fake out algorithms of other HFTs.” *Id.* As Lewis explains in *Flash Boys*, the HFT firms even “give these spoofing algos scary names like Ambush, Nighthawk and Raider.” *Id.*

92. Some examples of standard trading measures utilized by the HFT Defendants include:

(a) ***Trading Ahead.*** Most retirement savings, such as public and private pension funds or 401(k) and individual retirement accounts in the United States, are invested in mutual funds, the most popular of which are index funds which periodically “rebalance” or adjust their portfolio to account for current prices and market capitalization of the underlying securities in the stock or other index that they track. This allows trading algorithms to anticipate and trade ahead of stock price movements caused by mutual fund rebalancing, making a profit on advance knowledge of the large institutional block orders. This results in profits being transferred from investors to algorithmic traders, estimated to be at least 21 to 28 basis points annually for S&P 500 index funds, and at least 38 to 77 basis points per year for Russell 2000 funds.

(b) ***Electronic Front-Running.*** Electronic front-running is a practice whereby a market participant seeks to exploit large orders being placed out in the market. For example, a large order

¹⁶ See generally Jon Najarian, *How to ‘Unrig’ Markets*, CNBC, Apr. 11, 2014.

from a pension fund to buy will be broken into small parts and trading takes place over several hours or even days, and will cause a rise in price due to increased demand. An HFT firm can utilize preferred access to material trade data to try to identify this happening and then trade in front of the fund, buying the relevant security elsewhere and then profiting from selling back to the pension fund at increased prices.

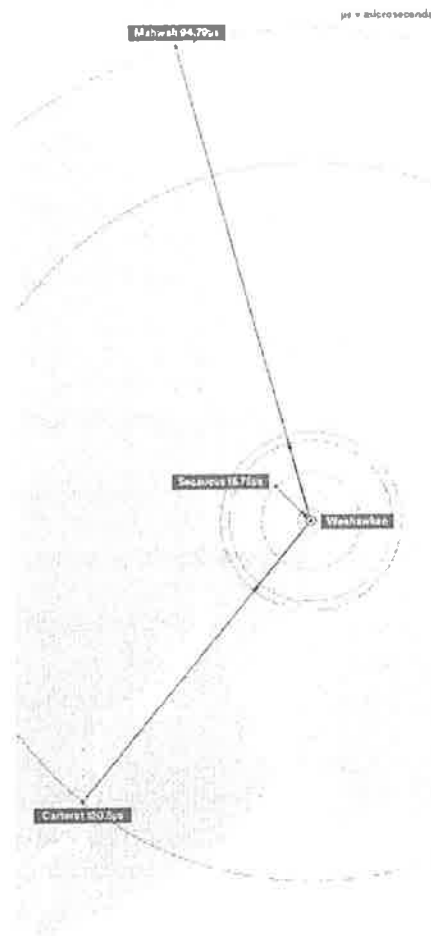
(c) *Slow-Market Arbitrage*. This practice relies on clunky, outdated market access technology employed by less-efficient brokerages. Utilizing HFT strategies, HFT traders use speed to gain minuscule advantages in arbitraging price discrepancies in some particular security trading simultaneously on disparate markets.

93. High frequency traders have claimed their practices substantially improve market liquidity, narrow bid-offer spreads, lower volatility and make trading and investing cheaper for other market participants. However, in September 2011, Nanex, LLC (a high frequency trading software company) published a report stating the contrary, revealing that the amount of quote traffic compared to the value of actual trade transactions over four and half years demonstrated a ten-fold *decrease* in efficiency.

94. With the influx of high frequency traders in the market, more fully automated markets such as NASDAQ, Direct Edge and BATS have gained market share from less automated markets such as the NYSE. The speeds of computer connections, measured in milliseconds or microseconds, have become important. For example, in 2009, the London Stock Exchange bought a technology firm called MillenniumIT and announced plans to implement its Millennium Exchange platform, which they claim has an average latency of 126 microseconds. Since then, exchanges have continued to evolve to reduce latency, competing to attract HFT traders, and today, with turnaround times of three milliseconds available, these very

fast exchanges allow HFT traders to pinpoint the consistent and probable performance ranges of stock prices.

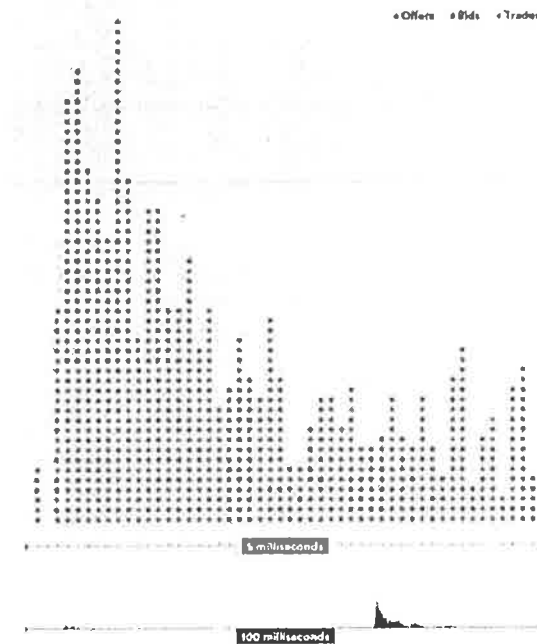
95. Especially since 2011, there has been a trend to use microwaves to transmit data across key connections, such as the one between New York and Chicago. This is so because microwaves travelling in air suffer a less than 1% speed reduction compared to light travelling in a vacuum, whereas with conventional fiber optics light travels over 30% slower. In the microseconds it takes a high frequency trader – depicted below in blue – to reach the various stock exchange servers housed in these New Jersey towns, the conventional trader's order, theoretically, makes it only as far as the red line. The time differences can be financially advantageous in a number of ways.



Michael Lewis, *The Wolf Hunters of Wall Street An Adaptation From 'Flash Boys: a Wall Street Revolt,'* N.Y. Times, Mar. 31, 2014.

96. Flash trading was initially introduced to allow participants like market-makers the opportunity to meet or improve on the National best bid and offer price (“NBBO”) to ensure incoming orders were matched at the most advantageous prices according to Regulation NMS. However, in practice, these programs were used by the Exchange Participants operating for profit to entice the HFT Defendants to transact on their exchanges by providing a sneak peek at order flow in return for payment without ordinary investor knowledge and then to use that information to profit to the detriment of ordinary investors.

97. The fact that the HFT Defendants are electronically front-running the trades of ordinary investors is demonstrated by the fact that high frequency trading activity is not constant; it occurs in microbursts – showing that it is only triggered by the placing of a bid or order by an ordinary investor, revealing that investor's intention. The example below is illustrative. The line at the bottom of this graphic is the stock market activity involving General Electric shares over 100 milliseconds (one-tenth of a second) at 12:44 p.m. on December 19, 2013. The gray box magnifies a five-millisecond window, during which GE experienced very heavy bid and offer activity, but only a total of 44 trades:



Lewis, *supra*, *The Wolf Hunters of Wall Street An Adaptation From 'Flash Boys: a Wall Street Revolt.'*

98. The SEC does not regulate high frequency trading. The brief but dramatic stock

market crash of May 6, 2010 (the “Flash Crash”), when the Dow Jones Industrial Average plunged to its largest intraday point losses, only to recover much of those losses within minutes is believed to have been caused by high frequency trading. After almost five months of investigations, the SEC and the CFTC issued a joint report identifying the cause that set off the sequence of events leading to the Flash Crash and concluding that the actions of high frequency trading firms contributed to volatility during the crash. To date the SEC has taken no steps to regulate high frequency trading.

99. The SEC does not regulate high frequency trading because much of it does not occur on the public exchanges. Under pressure from state attorneys general to regulate high frequency trading, in 2012 the SEC spent \$2.5 million on a surveillance system named Midas (Market Information Data Analytics System) that collected information from all (then) thirteen *public exchanges* in the U.S. This, however, did not give the SEC a picture of the whole market. Only 70% of trading happen on public exchanges; the rest takes place offline, inside the large, in-house alternate trading systems that match buy and sell orders internally. To see that activity, the SEC would need a much more powerful system that could track the life of every stock quote, order, and trade, including when the transactions occurs, the brokers involved, and the customers on whose behalf they are acting – and the Congressional mandate to regulate high frequency trading.

Alternate Trading Systems (also known as “Dark Pools”)

100. Dark pools became a controversial force in the marketplace in the 2000s. In the parlance of Wall Street, “dark pools” were private markets that were hidden from public investors who traded on such “lit” pools as the NYSE and NASDAQ. Institutions and other market participants that had large positions to move were attracted to dark pools as a means to

hide their intended transactions from the algorithms being developed and refined by the HFT Defendants to seek out and then exploit such large transaction order information through the manipulative and other illegal and predatory order practices as alleged herein. Unlike registered exchanges, dark pools were virtually unregulated, and most information regarding their mechanics and participants were kept closely guarded by those involved. The HFT Defendants, for their part, hired large numbers of hard science PH.Ds and mathematicians to develop computer trading programs that would allow HFTs to penetrate the veil of secrecy and exploit the order information hidden within the dark pools.

101. The fragmentation of financial trading systems and electronic trading that Reg NMS precipitated also rapidly increased the desirability of dark pools, which are normally accessed through crossing networks or directly between market participants. Many of the nation's largest financial services firms, including the Brokerage Firm Defendants identified herein at ¶¶20-33, all have divisions within them that operate alternate trading systems. Alternate trading systems have grown so much that experts worry that publicly quoted prices for stocks on exchanges no longer properly reflect where the market is. Approximately 40% of all U.S. stock trades, including almost all orders from "main street" investors, now happen "off exchange," up from 16% just a few years ago. This both defeats the purposes of the 1975 national market system reforms, and effectively makes it impossible to comply with Reg NMS's requirements that investors' orders be immediately filled at the best price available.

102. Alternate trading systems are of various types and can execute trades in multiple ways, including throughout the day or at scheduled times. Neither the size of the trade nor the identity are revealed until the trade is filled. One of the main *purported* advantages for institutional investors in using alternate trading systems is for the buying or selling large blocks

of securities without showing their hand to others and thus avoiding market impact.

However, it also means that the institutional investors trading on such ATSs must place even greater reliance upon the honesty and integrity of their brokers to act in the institutional investors' best interest.

103. One of the driving forces behind the expansion of dark pools was that the "lit" exchanges had become the province of highly sophisticated traders deploying highly developed and constantly refined algorithmic trading, carried out by use of electronic platforms for entering trading orders with an algorithm which executes pre-programmed trading instructions whose variables may include timing, price, or quantity of the order, and in many cases initiating the order by a "robot", without human intervention (known as "bot algos" or "robo algos"). With the Exchange Participants providing Defendants expensive, data-rich feeds that broadcast terabytes of information about specific buy and sell orders being generated from large mutual and pension funds, the HFT profits swelled to enormous proportions at the expense of ordinary investors.

104. The traders affiliated with the financial institution operating a particular alternate trading system can also trade in that system – and many of these alternate trading system operators also sell access to their bid/offer data to outsiders – *including HFT firms*. As more and more institutions and other large traders sought the hoped-for anonymity of dark pools for their transactions, the very same HFT Defendants and their predatory bot algos soon followed, leaving no place for the investor to hide.¹⁷

¹⁷ At a closed meeting at Miami Beach's Fontainebleau Hotel on March 10, 2011, Dan Mathisson, the creator of Defendant Credit Suisse's Crossfinder dark pool (which had become the largest in the world by 2011), addressed a select audience of hedge fund managers, electronic traders and computer programmers: "The heart of the problem, Mathisson explained, was that fast-moving robot trading machines were front-running long-term investors on exchanges such

105. In practice, many brokers simply lob customer orders/bids into the alternate trading systems and leave them sitting there, where the traders of the financial firm that operates the alternate trading system – and any firms paying those operators for access to that data – can trade against the interests of the broker’s customers, including Plaintiffs and the members of the Plaintiff Class, by quickly going out, placing bids/orders on other exchanges to discover pricing availability – and often to affect that pricing – then transacting at the optimal price and coming back and transacting with the broker’s customers in the alternate trading system – taking an unfair advantage and an unfair profit in the process.

DEFENDANTS’ SCHEME AND FRAUDULENT COURSE OF BUSINESS

106. By employing the aforementioned devices, contrivances, artifices and manipulations, Defendants pursued a fraudulent scheme and wrongful course of business that operated as a fraud or deceit on public investors trading stocks on the U.S. stock exchanges.

107. During the Class Period, the HFT Defendants engaged in unlawful practices, including: extensive use of new forms of self-serving and predatory orders that disadvantaged the general investor while attracting more business to the Exchange Participants and the Brokerage Firm Defendants, contemporaneous trading on material, non-public data, electronic front-running, rebate arbitrage, slow-market arbitrage spoofing and layering.

Use of Predatory Orders

as the New York Stock Exchange and the Nasdaq Stock Market. For instance, if Fidelity wanted to buy a million shares of IBM, the Bots could detect the order and start buying IBM themselves, in the process driving up the price and making IBM more expensive. If Fidelity wanted to sell a million shares of IBM, the Bots would also sell, pushing the price down and causing Fidelity to sell on the cheap. To escape, the victims of the front running were turning to dark pools. ‘Why are people choosing to send orders to dark pools instead of the displayed markets?’ Mathisson asked his audience. ‘They’re choosing dark pools because of *a problem with lit markets.*’” (emphasis original) Scott Patterson, DARK POOLS: THE RISE OF THE MACHINE TRADERS AND THE RIGGING OF THE U.S. STOCK MARKET 4-5 (2012).

108. Since the Reg NMS regulatory framework was introduced in 2007, the Participant Exchanges have been introducing “innovations” such as preferential price-sliding and orders that “hide and light,” in order to enable the HFT Defendants to circumvent the restrictions introduced by Reg NMS for the protection of investors that might have otherwise prevented the explosive growth and profitability of the HFT Defendants. These innovations resulted in a number of order matching engine practices that served to give the HFT Defendants unfair and illegal advantages over Plaintiffs and the Plaintiff Class during the Class Period:

- a) unfair order handling practices that permit the HFT Defendants to step ahead of investor orders in violation of price-time priority;
- b) unfair rebooking and repositioning of investor orders that permit the HFT Defendants to flip out of toxic trades ahead of other market participant who should have been given queue priority;
- c) unfair conversion of investor orders eligible for maker rebates into unfavorable executions incurring taker fees;
- d) unfair insertion of HFT Defendant intermediaries in between legitimate customer-to-customer matching and thereby gaining an improper profit; and
- e) unfair and discriminatory order handling of investor orders during sudden price movements, taking full advantage of colocation and access to high-speed data feeds not available to members of the Plaintiff Class dependent upon the SIP feed for updated market information.

109. While many focused on HFT speed alone as the reason for the perceived unfair advantage, the order matching abuses were in fact the primary alpha that allowed the HFT Defendants to proliferate, since the principal features of these predatory order types made

traditional order types impossible to use without being subjected to order matching engine abuses. In order to make HFT scalping strategies profitable over time, there had to be some structural advantage, or alpha, in addition to basic order book depth asymmetry signals and execution tactics, which meant developing an ability to plumb the very market microstructure to learn how one system interconnected with another system.

110. As HFT critic Haim Bodek explained the advent of predatory order types as the driving force behind the continuing success of the HFT Defendants:

The sophisticated usage of special order types and order matching engines in today's US equity exchanges is now a primary alpha. ... When used appropriately, these order types ensure favorable queue position, providing HFT with better execution as well as protection against losses. HFTs use special order types to gain favorable queue position on entry, ahead of customers and other traders. On exit, knowledge and manipulation of queue position allow HFTs to flip out for outright winners or for scratch instead of 1 tick losers.

...HFT scalps micro-edges and rebates. Tiered rebates subsidize opportunity costs and realized losses, turning scratch trades into winners. Large losses due to sweeps (adverse price movements against their transient and/or potential positions) can overwhelm any profitability, so management of sweep risk is paramount. HFTs use the market microstructure to detect and avoid sweep risk, which is the risk associated with trading against large informed toxic orders (e.g. large institutional orders) that take out multiple levels of the order book.¹⁸

Spam and Cancel Orders

111. Rule 610 defined the precise conditions under which the HFT Defendants could obtain a superior position in the order queue by managing to enter a "lit" order that would lock an away market. The HFT Defendants traders first found a way to gain an unfair market advantage over the Plaintiff Class by utilizing "spam and cancel" orders developed in collusion with the Exchange Participants. The Exchange Participants developed a simple order matching

¹⁸ HAIM BODEK, THE PROBLEM OF HFT: COLLECTED WRITINGS ON HIGH FREQUENCY TRADING & STOCK MARKET STRUCTURE REFORM 21-22 (2012)

engine feature to comply with Rule 610 by price-sliding orders rather than canceling them outright. This practice modifies the price of an order that would have otherwise locked the market by ticking or sliding.

112. The HFT Defendants could then use their superior speed and access to proprietary investor information to learn that there was an order that had been slid back and that did not have a high queue placement. The HFT Defendants would also know that there was an order ahead in a better queue position, and that they needed to cancel their order quickly and re-enter a new order. While the HFT Defendants canceled their and re-entered their orders, whether already slid or not, regular investor orders would typically just slide and not be cancelled, as often regular investors, including institutions, had no idea that their orders had been slid in the first place. In this manner, the HFT Defendants, through constant spamming and cancelling, would eventually work their way to the top of the order queue and take advantage of marketable orders ahead of other disadvantaged investors left in the dark.

113. The HFT Defendants also benefited from the Exchange Participants helping them create special order confirmation information that would detect immediately if their orders had been slid so that they could quickly cancel the price-slid order. The Exchange Participants also provided cancel-back or “opt out” options that would work to reject automatically orders that might have otherwise been placed in a disadvantaged queue position.

Hide and Light Orders

114. After the HFT Defendants had achieved dominance in top-of-book trading activity through spam and cancel strategies, the Exchange Participants worked with the HFT Defendants to create a new series of special order types that would “hide and light” specific orders and give the HFT Defendants even more control over the top of the order book.

Whereas the normal exchange practice was to price-slide back a tick and “light” any order that would otherwise have caused a locked market in violation of Rule 610, these new types of exchange orders would be priced to lock an away market. Since they were hidden orders, they did not violate Reg NMS because they were not displayed prices and thus not considered “protected quotations” as defined by Reg NMS. They would remain hidden at the locked price and would then automatically become “lit” the very instant that the away market was no longer locked.

115. Since hidden orders were given a lower queue priority under exchange order precedence rules, the HFT Defendants still needed to find a way to reserve a place at the top of the order queue:

“Hide and light” order types solved this problem of reserving a superior queue position by, in the industry jargon, “lighting” the hidden order automatically when the order would no longer result in a violation of Rule 610 (i.e., when the away market “unlocked”). In other words, the primary advantage embedded in a “hide and light” order was its ability to transform from a hidden order into a Protected Quotation at precisely the time a market was permitted to display an aggressive price. It should come as no surprise that the power of the order type was almost purely in its ability to get an HFT to the top of the queue.

Hence, the “lighting” process became key to dictating an HFT’s queue position. In essence, “lighting” is the key event in which an exchange picks the winners and losers in achieving a superior queue position.

Most institutions are not even aware of the dependence of HFT strategies on exchange “lighting” events. For several years, and including to this day, the mechanisms through which orders that “hide and light” are converted from hidden orders to be rebuked as Protected Quotations are improperly and inadequately documented.¹⁹

116. In the period from 2007 to 2012, the Exchange Participants engaged in intense competition with one another to develop the most effective types of hide and light orders that

¹⁹ Bodek, Haim, *Locked Markets, Priority and Why HFTs Have an Advantage: Part II: Hide and Light* (Tabb Forum Oct. 16, 2012), available at <http://tabbforum.com/opinions/locked-markets-priority-and-why-hfts-have-an-advantage-part-2-hide-and-light>.

would reflect the particular needs of the HFT Defendants in the context of the particular idiosyncrasies of each exchange's order system. Foremost among these Exchange Participant order types were NASDAQ with "Price to Comply," BATS with "Display-Price Sliding," NYSE ARCA with "Post No Preference Blind" and Direct Edge with "Hide Not Slide."

117. For example, using Exchange Participant Direct Edge's "Hide Not Slide" version of a "hide and light" order, an institutional investor sends a straight order to buy Cisco Systems up to \$24.01 a share to Direct Edge, with instructions to be filled only at Direct Edge and not to be routed elsewhere. At the same time, although there is no matching sell order at Direct Edge, there does exist such a sell order on Nasdaq, but that is also an order that can be only filled on that exchange. This would be considered a locked market, and Direct Edge, without further instruction, would have to slide the institution's order to \$24.00. If an HFT trader then enters a buy order as "Hide Not Slide" at the same price of \$24.01, the order will not be barred by Rule 610 because it is not a displayed order and it will not slide. When the market unlocks, either by having the sell order on Nasdaq filled or canceled, the HFT trader's "Hide Not Slide" order is instantly converted back to a lit or displayed order at \$30.01 and is eligible to trade against Cisco shares posted for sale on Direct Edge at that price. As for the institution's order that slid to \$30.00, it converts back to the original \$24.01 price, but it is placed behind the "Hide Not Slide" order in the queue, even though the order was entered first and at the same limit price.

Immediate or Cancel Intermarket Sweep Orders

118. At the time of the formulation of Reg NMS, Rule 611 (the order protection rule, commonly known as the "trade through rule") was created to prevent orders on one exchange from being executed at prices that are inferior to those protected quotes on another exchange. Read together with Rule 610, Rule 611 provides a prohibition on exchanges from executing

trades that can be filled at better prices at away markets. Institutional investors were concerned that this new Rule would severely impede their ability to execute large orders efficiently and at minimum price risk, when trading across a fragmented marketplace would put them at a great disadvantage if they had to work through every separate bid or offering one step at a time. In order to address institutional concerns, the SEC created an exception to Rule 611 known as the intermarket sweep order (“ISO”), to be used by institutions that needed to sweep through multiple levels of the order book. While normal orders routed to a market not displaying the best price would create a trade-through situation requiring the exchange either to reject or reroute the order, ISOs are executed without any requirement to check away market pricing or to apply trade-through protections

119. While ISOs were intended to be used by institutions, the HFT Defendants very quickly learned to leverage such orders to get ahead of slow SIP feeds during price moves. Using the simplest form of “immediate or cancel” (“IOC”) ISO, the HFT Defendants instruct the exchange accepting such orders to execute immediately an order at a specific price or to cancel it, with no requirement to check if the order trades through any protected price at an away exchange. While the executing broker-dealer is required to affirm that it is also sending orders to any market showing a more advantageous price, the broker is not bound to use information from the slow SIP feed. If the broker has a faster direct feed, then the broker can limit sending orders to hit SIP prices that the broker already knows will be stale and no longer exist.

120. Haim Bodek explains how regular investors become disadvantaged:

When the SIP feed slows down (which can happen in a fast market as a result of delays on as few as one of the 13 exchanges), customers that use traditional orders can be disadvantaged, as they are rejected or unsuccessfully rerouted due to phantom SIP quotes created by race conditions and latencies. HFTs and other

sophisticated participants that are able to use IOC ISOs suffer no such burden. In other words, while traditional orders based upon slow SIP data and trade-through routing chase SIP quotes that don't exist, HFTs using ISO orders and fast data feeds can access rapidly diminishing liquidity on price moves and thus outflank the latency-prone tactics.

In fast markets, HFTs benefit from the slow SIP feed in a manner that may exasperate rapid price movement as they maneuver to avoid adverse flows -- they are able to pull their unexecuted orders on venues before they trade against customers using marketable non-ISO orders that are rerouted or rejected due to phantom SIP prices. Thus, for a portion of order flow, HFT scalping strategies are in essence protected by the exchanges' implementations of Rule 611 -- implementations that in effect provide a shield against an onrush of public orders in fast market conditions, as such orders are rejected or rerouted.²⁰

Day Intermarket Sweep Orders

121. In addition to defining the basic contours of an ISO, Rule 611 also introduced another variant known as the day ISO. Day ISOs were originally intended to allow large institutions with very large orders to sweep the order book and then post an aggressive bid for the unfilled portion of their order at their most aggressive price.

122. The HFT Defendants, however, quickly learned to adopt this order form into one of their principal tools for posting liquidity ahead of slow SIP feeds in order to light aggressive new prices. Using Day ISOs, the HFT Defendants are able to gain access to price information that would otherwise be unavailable to traders who rely on exchanges to comply with trade-through rules.

123. Because the Day ISOs enter the market as protected quotations, they step ahead of other orders already resting on the book at the same price, but which were price slid or hidden in order to comply with Rule 610 and the ban on locked markets, including "hide and light" orders:

²⁰ Bodek, Haim, *Why HFTs Have an Advantage, Part 3: Intermarket Sweep Orders* (Tabb Forum Oct. 29, 2012), available at: <http://tabbforum.com/opinions/why-hfts-have-an-advantage-part-3-intermarket-sweep-orders>.

Not only do HFTs exploit DAY ISOs to get ahead of slow SIP feeds while avoiding the disadvantaged exchange order handling treatment described above [regarding the application of Rule 610], HFTs also use DAYISOs to step ahead of “hide and light” orders already resting on the book. What is most remarkable about DAY ISOs is this ability to queue jump orders that arrived at the exchange at the same price as, but prior in time to, the DAY ISO.

To appreciate the significance of DAY ISO queue jumping, it is key to understand that among all the special order types, only the DAY ISO can light a new aggressive price on an exchange that locks an away market. In practice, this lightning capability provides an alternative end-around to Rule 610 and the ban on locked markets and provides HFTs a backdoor to the top-of-queue.

...HFTs often leverage DAY ISOs to get to the top-of-queue on an NBBO change in cases where there is a slow SIP or when there are race conditions between prices disseminated on direct feeds. Hence, the fastest firm gets the top-of-queue and controls the actual “lighting of the market.” Indeed, HFTs are dictating the timing of an NBBO change on the SIP when using DAY ISOs.²¹

Electronic Front-Running

124. NYSE former Rule 92, FINRA Rule 5320 Information Memo No. 80-38 (“Memo”), expressly prohibits trading ahead. The Memo provides, in part, that members and member organizations “should not trade in options or in underlying securities by taking advantage of their possession of material, non-public information concerning block transactions in these securities.” This type of conduct is inconsistent with “just and equitable principles of trade” and a member who violates this rule may face disciplinary proceedings under NYSE Rule 476. *See also* NYSE Exchange Rule 105(h), “Prohibition Against Front-Running of Blocks.” The activities alleged herein and the NYSE’s knowing formulation of processes enable these practices and violate the prohibition against trading ahead.

125. The HFT Defendants purchased access to information concerning the

²¹ Haim Bodek, THE PROBLEM OF HFT: COLLECTED WRITINGS ON HIGH FREQUENCY TRADING & STOCK MARKET STRUCTURE REFORM 43-44 (2012)

proprietary non-public intent of Plaintiffs and members of the Plaintiff Class, including their intention to purchase or sell securities, their price sensitivity, margin requirements, and/or the amount of shares they intended to transact in, by purchasing access to this data from the Exchange Participants and the alternate trading systems. The HFT Defendants did this, first, by paying the Exchange Participants to permit them to install their own computers directly within or in close proximity to the Exchange Participants' own order matching boxes. The Defendants knew these "co-location" arrangements were intended to and would in fact provide the HFT Defendants with nearly instantaneous access to investor orders and bids placed on the Exchange Participants by the Brokerage Firm Defendants, and did so knowing the HFT Defendants could and would use the data to trade in front of Plaintiff Class members.

126. The HFT Defendants paid the Exchange Participants millions of dollars for co-location rights to reduce their own latency *vis-a-vis* other traders.²² They also paid the operators of alternate trading systems they did not own or operate for access to this same data within their alternate trading systems.

127. For example, when a broker placed an order to purchase 100 shares of Proctor & Gamble on the NYSE or an alternate trading system, the HFT Defendants got access to it within milli- or even microseconds and were able to actively look at all the other exchanges and alternate trading systems – using their high speed cable and/or radio wave signal technology – and discover where the shares to be purchased could be purchased most cheaply, or where the shares to be sold could be sold for the highest price. They then raced the investor's order to that

²² "Colocation gives HFT firms the ability to see information a fraction of a second faster than other customers. And for this privilege, HFTs are willing to pay an enormous sum of money, which could range in the hundreds of thousands of dollars per year for a high-volume HFT firm. Large HFT firms collocate their servers with most of the major exchanges so that they can have the fastest access to every bit of trading data available." Sal Arnuk & Joseph Saluzzi, *BROKEN MARKETS* 101 (2012).

exchange, transacted, and then fulfilled the investor's order.

128. To do so however, the HFT Defendants put out "pings" (or small orders or bids) on all of the other exchanges to locate the best price. In so doing, the HFT Defendants necessarily increased the perceived demand for the relevant stock, often resulting in artificial price increases/decreases. The HFT Defendants, however (through the operation of complex orders the Exchange Participants agreed to create just for these purposes), just as instantaneously cancel all unwanted orders and bids. Through this "pinging," the HFT Defendants increase demand for the stock (at a certain price point) and thus manipulate its price. As a result though, while the HFT Defendants may transact at the best quote available on a particular exchange when they eventually transact, they have too often run up/down those prices before trading due to their own efforts to electronically front-run the investors' orders – and so they transact for the investor at a price that damages the investor.

Rebate Arbitrage

129. Purportedly to increase and improve liquidity on their exchanges – which draws more business into their exchanges and allows the exchanges to collect greater fees from the increased trading – the Exchange Participants historically began paying brokers and HFT firms to transact on their exchange to the extent they were placing a new bid or offer there. Such activity is characterized in the industry as "making" liquidity. Conversely, those who merely pay the bid or offer price quoted on an exchange are characterized in the industry as merely "taking" liquidity.

130. Early on, many Exchange Participants adopted maker/taker pricing plans.²³

²³ The maker/taker model is in contrast to the "customer priority" model, whereby any account identified as a "customer" goes to the head of the queue for priority of fill, without paying a transaction fee to the exchange. The exchange charges market-makers fees for transactions.

Makers got paid rebates to place their orders and bids on the exchange whereas takers had to pay to fulfill their orders on the same exchange. Investors pay their brokers a commission to conduct their trades, but these maker/taker fees paid to – or not charged by – the exchanges were separate and apart from that. As such, they often incentivized brokers to be market-makers rather than takers. However, with the advent of so many new stock exchanges, competition grew and strategies varied, and soon certain exchanges became incentivized to pay takers and charge makers. *See, e.g., Flash Boys* at 36 (“the BATS exchange . . . perversely paid takers and charged makers”). BATS did this to entice brokers to send their orders to BATS – where BATS knew high frequency traders were waiting – even though it did not increase liquidity in the process.

131. The different pricing models being employed across the various public exchanges and alternate trading systems soon created a new arbitrage opportunity for HFT traders. In addition to the need for speed that electronic front-running required, HFT traders were incentivized to trade on more electronic exchanges and to trade where they got paid to do so. *This incentivized HFT traders to hold off on fulfilling an order at the best price available on a particular exchange if the exchange offering the best price demanded payment from them to complete the order.* Instead, the HFT firms, which were way out ahead of the rest of the market by micro- if not milliseconds, were incentivized to create more interest in the stock by pinging more exchanges – even if doing so increased the market price for the stock suddenly – in order to close the trade on an exchange that would pay them the largest rebate rather than charging them a fee to transact. Again, the price increase such delays precipitated were ultimately borne by Plaintiffs and members of the Plaintiff Class.

Slow-Market (or Latency) Arbitrage

Payment for order flow is also paid to brokerage firms as an inducement to send their orders to a given exchange.

132. Latency arbitrage occurs when different people and firms receive market data at different times. These time differences, known as latencies, may be as small as a billionth of a nanosecond, but in the world of high frequency trading, such differences can be crucial. So crucial, in fact, that HFT trading firms pay exchanges substantial sums to be located closer to exchanges' servers – each foot closer saving one nanosecond. Latency arbitrage occurs when high frequency trading algorithms make trades a split second before a competing trader, and then resell the stock seconds later for a small profit. In effect, latency arbitrage is about using the most advanced technology and collocated servers at exchanges and ATSS, combined with purchases of raw data feeds from the same market centers. By then using their speed advantage, the HFT Defendants effectively create their own inside National Best Bid and Offer (NBBO) quote and book sufficiently earlier than when such information would be available to ordinary investors through the Securities Information Processor ("SIP") quote, allowing them to react to changing market conditions nanoseconds ahead of other traders.

133. The HFT Defendants can then use their predatory algo bots, through immediate or cancel or cancel and replace orders, and dark pool pinging, to discover the contours of what size and nature of institutional orders are in the market, such as those driven by VWAP ("volume weighted average price") formulas and often preferred by institutions. Once the HFT Defendants have gathered this information, they can engage in virtually risk-free arbitrage opportunities.

134. The following example shows how an HFT trading computer would use such information to take advantage of an identified institutional VWAP algo order to buy a particular stock:

- a) Assume the market for the ABC company is \$22.20 bid and offered at \$22.21.

- b) With the benefit of latency arbitrage, the HFT computer knows that there is an institutional order coming from the SIP feed in a moment that will move the NBBO quote higher to \$22.21 bid and offered at \$22.23.
- c) The HFT uses its speed advantage to buy all available ABC shares at \$22.21 from any dark or visible pools showing such an offering price or cheaper.
- d) The institutional VWAP algo gets nothing done off the SIP feed as by that time there are no offers left at that price, and the market moves up to \$22.21 bid and offered at \$22.23 as expected.
- e) The HFT then offers the ABC shares just purchased at \$22.22.
- f) Because the institution is using a VWAP algorithm, the institution is forced to buy the available shares at the new offering price of \$22.22.
- g) The HFT makes \$0.01 (or more if the offering is higher) at the expense of the institution.

According to one study, at least 10% of all HFT trading falls into this type of predatory activity, and based upon estimated 2012 share volumes this would result in approximately 600 million shares per day being subject to predatory HFT, which even at a \$0.01 - \$0.02 per share rate would produce \$6 million to \$12 million a day or between \$1.5 billion to \$3 billion a year in wrongful gains taken from institutional and retail investors.²⁴

Spoofing and Layering

135. So-called “spoofing” and “layering” (collectively, “layering”) are HFT strategies that use non-*bona fide* orders, or orders that a trader does not intend to have executed, that are designed to induce others to buy or sell the security at a price not representative of actual supply and demand. Such practices are designed to and do manipulate the market.

136. More specifically, HFT firms place *bona fide* buy (or sell) orders they intend to

²⁴ See Sal Arnuk & Joseph Saluzzi, BROKEN MARKETS: HOW HIGH FREQUENCY TRADING AND PREDATORY PRACTICES ON WALL STREET ARE DESTROYING INVESTOR CONFIDENCE AND YOUR PORTFOLIO 248 – 50 (2012).

have executed, and then immediately enter numerous non-*bona fide* sell (or buy) orders for the sole purpose of attracting interest to their *bona fide* orders. The placement of these non-*bona fide* orders is to induce, or trick, other market participants to execute against their initial *bona fide* orders. Immediately after the execution against the *bona fide* orders, the HFT firms cancel the open non- *bona fide* orders. They typically then repeat this strategy on the opposite side of the market to close out the position. Using this strategy, the HFT firms induce other market participants to trade in a particular security by placing and then cancelling layers of orders in that security, creating fluctuations in the national best bid or offer of those securities, increasing order book depth, and using the non-*bona fide* orders to send false signals regarding the actual demand for such securities, which the other market participants misinterpret as reflecting true demand and in this way manipulate the market. The HFT Defendants' orders are intended to deceive and do deceive other market participants into buying (or selling) stocks from (or to) the HFT firms at prices that have been artificially raised (or lowered) by the HFT Defendants.²⁵

137. By virtue of this misconduct, the HFT Defendants have violated §10(b) of the Exchange Act and Rule 10b-5 promulgated thereunder.

Insider Trading

138. Stock exchanges pay brokerage firms or HFT firms for the privilege of executing the brokerage or HFT firms' customers' orders and turning them into trades. This practice is

²⁵ As just one example, on September 13, 2010 FINRA announced that it had censured and fined HFT Trillium Brokerage Services for using an illicit high frequency trading strategy by entering "numerous layered, non-bona fide market moving orders to generate selling or buying interest in specific stocks. By entering the non-bona fide orders, often in substantial size relative to a stock's overall legitimate pending order volume, Trillium traders created a false appearance of buy- or sell-side pressure." FINRA News Release dated September 13, 2010, *available at*: <http://www.finra.org/Newsroom/NewsReleases/2010/P121951>.

called “payment for order flow.” As part of this process, the Brokerage Firm Defendants, however, disclose to HFT Defendants proprietary non-public information about the brokerage customers’ trading intentions, including intended trade size, price sensitivity and/or margin requirements.

139. Because HFT firms pay exchanges and alternate trading systems for access to this non-public trade data, and the exchanges and alternate trading systems pay brokerage firms to have the brokerage firms place their orders on a specific trading system, brokerage firms like Schwab, TD Ameritrade and E*TRADE all directly or indirectly receive tens of millions of dollars a year in kickback payments from the HFT Defendants and alternate trading system operators for the Brokerage Firm Defendants’ client trade data, *the totality of which is concealed from those clients, the Plaintiff Class*. For instance, Schwab, in just 2012 and 2013, pocketed tens of millions of dollars in payments from the following HFT Defendants for directing its customers’ trades to specific trading systems for which Schwab received payments, the totality of which payments were concealed from its customers whose trades were ultimately being sold:

Other revenue – net decreased by \$20 million, or 8%, in 2013 compared to 2012 primarily due to a non-recurring gain of \$70 million relating to a confidential resolution of a vendor dispute in the second quarter of 2012 and realized gains of \$35 million from the sales of securities available for sale in 2012, *partially offset by an increase in order flow revenue that Schwab began receiving in November 2012.*

Other revenue – net increased by \$96 million, or 60%, in 2012 compared to 2011 primarily due to a non-recurring gain of \$70 million relating to a confidential resolution of a vendor dispute mentioned above. *In November 2012, the Company began receiving additional order flow rebates from market venues to which client orders are routed for execution. Order flow revenue increased by \$23 million due to this revenue and the inclusion of a full year of optionsXpress’ order flow revenue.*²⁶

²⁶ From Schwab’s 2013 annual report to its shareholders filed with the SEC on Form 10-K.

140. Likewise, the Brokerage Firm Defendants and the HFT Defendants received tens of millions of dollars in rebates from the various exchanges and alternate trading systems to transact on those trading systems.

141. The combined effect is that the HFT Defendants pay the Exchange Participants and ASTs millions of dollars annually for early access to material non-public information detailing the investment plans of Plaintiffs and members of the Plaintiff Class – information the Brokerage Firm Defendants essentially sell the HFT Defendants and the Exchange Participants by placing their customers' trades on public exchanges and alternate trading systems and receiving rebates on the backend of those transactions.²⁷ The Exchange Participants also pay the HFT Defendants and the Brokerage Firm Defendants to transact on their exchanges in order to increase the trading on their exchanges and to increase their portion of the take from the unlawful practices detailed herein.

142. In so doing, the HFT Defendants and the Brokerage Firm Defendants purchase and sell securities while in possession of material non-public information in contravention of the federal securities laws, SEC Rules and the regulations of the exchanges.

COUNT I

Violation of §10(b) of the Exchange Act and Rule 10b-5 (Against All Defendants)

143. Plaintiffs repeat and reallege each and every allegation contained in the above

²⁷ In a further variation of this unlawful conduct, the SEC recently announced that Liquidnet Holdings, a dark pool operator, agreed to pay a \$2 million fine to settle SEC accusations that it had improperly used confidential information about its customers in marketing a new product to corporate clients whose shares had been transacted by Liquidnet institutional investor customers on the Liquidnet dark pool. William Alden, NYT 06062014, *available at*: http://dealbook.nytimes.com/2014/06/06/liquidnet-a-dark-pool-operator-is-fined-2-million-over-customer-data/?_php=true&_type=blogs&_r=0.

paragraphs as if fully set forth herein.

144. During the Class Period, Defendants engaged in illegal acts and practices, including contrivances and manipulations, and participated in a fraudulent scheme and wrongful course of business, which was intended to and did operate as a fraud or deceit on the investing public, including Plaintiffs and other members of the Plaintiff Class. Defendants' unlawful conduct caused Plaintiffs and Plaintiff Class members to purchase and sell shares and stock options at distorted and manipulated prices, enriching Defendants and damaging Plaintiffs and the Plaintiff Class.

145. Defendants: (i) employed devices, schemes and artifices to defraud; and (ii) engaged in acts, practices and a course of business which operated as a fraud and deceit upon the purchasers and sellers of shares and stock options on the exchanges, including Plaintiffs and Plaintiff Class members. In an effort to enrich themselves through use of these preferential and predatory order types, manipulative tactics, illicit kickback payments, and insider trading proceeds, Defendants wrongfully misappropriated material non-public information about Plaintiffs' and the Plaintiff Class's further intentions to trade (both as to amount and price), tipped one another as to those intentions, and otherwise distorted and manipulated the pricing of their securities in violation of §10(b) of the Exchange Act and Rule 10b-5. All Defendants are sued as primary participants in the wrongful and illegal conduct and scheme charged herein, as each engaged in the manipulative acts and deceptive practices detailed herein.

146. Defendants had actual knowledge of the illegal practices and insider trading set forth herein. Defendants' scheme was designed to and did defraud Plaintiffs and the Plaintiff Class by distorting the prices they paid for shares of stock and stock options in the markets.

147. As a result of Defendants' misconduct, the trading prices of the securities and stock

options purchased or sold on exchanges and on alternate trading systems by public investors were artificially manipulated and distorted during the Class Period. In ignorance of the true facts and the illegal practices of Defendants during the Class Period, Plaintiff and other Plaintiff Class members purchased and/or sold shares and stock options at artificially distorted and manipulated prices and were damaged thereby.

148. Had Plaintiffs and other Plaintiff Class members known of the truth concerning Defendants' illegal practices, they would not have purchased or sold stock or stock options on these exchanges and on these alternate trading systems at the artificially distorted and manipulated prices which they paid. Plaintiffs and members of the Plaintiff Class that traded during the Class Period and that relied on the integrity of the market in the securities listed and the markets quoted in such securities on such public exchanges.

149. By virtue of the foregoing, Defendants have violated §10(b) of the Exchange Act, and Rule 10b-5. As a direct and proximate result of the wrongful conduct by Defendants, Plaintiffs and the members of the Plaintiff Class suffered damages in connection with their purchases and/or sales of stock and stock options during the Class Period.

COUNT II

Violation of 20A of the Exchange Act

(Against the Brokerage Firm Defendants and HFT Defendants)

150. Plaintiffs repeat and reallege each and every allegation contained in the above paragraphs as if fully set forth herein.

151. A defendant violates §20A of the Exchange Act "by purchasing or selling a security while in possession of material, non-public information" and is "liable . . . to any person who, contemporaneously with the purchase or sale of securities that is the subject of [a

violation of the Exchange Act], has purchased . . . or sold . . . securities of the same class.” 15 U.S.C. §78t-1(a). In *Shapiro v. Merrill Lynch, Pierce, Fenner & Smith, Inc.*, 495 F.2d 228, 237 (2d Cir. 1974), the Second Circuit Court of Appeals found that trades within a four-day period were contemporaneous for purposes of §20A, and that there need be no privity between the defendant and the plaintiff. *Id.* at 237-39. Any person who “communicat[es] material, nonpublic information” to such a defendant is “jointly and severally liable . . . with, and to the same extent as, [the defendant] to whom the communication was directed.” 15 U.S.C. §78t-1(c).

152. Here, while Plaintiffs and the Plaintiff Class purchased and sold the stock and stock options of publicly listed companies at artificially distorted prices on exchanges and alternate trading systems rigged by Defendants’ manipulative conduct, the Brokerage Firm Defendants and HFT Defendants profited by orchestrating the scheme alleged herein whereby the HFT Defendants contemporaneously purchased and/or sold shares and stock options while in possession of adverse, material non-public information, pocketing billions of dollars of profits (as detailed herein, portions of which have been paid to the Brokerage Firm Defendants in the form of kickback payments for transacting for their customers on rigged exchanges and in alternate trading systems, and received by the HFT Defendants in the form of illicit front-running profits, illicit rebate arbitrage profits and savings, and in illicit slow-market arbitrage profits). The Brokerage Firm Defendants and HFT Defendants also both knew that they were engaged in predatory trading that was distorting market prices in front of Plaintiffs’ and the Plaintiff Class’s trades while Plaintiffs and the Plaintiff Class did not. Plaintiffs and members of the Plaintiff Class traded contemporaneously with these Defendants by purchasing or selling publicly traded shares and stock options at artificially manipulated prices during the Class

Period, and were damaged thereby.

153. Plaintiffs and all the other members of the Plaintiff Class who purchased and/or sold publicly traded stock and stock options contemporaneously with Defendants' purchases and sales have suffered substantial damages in that they paid and/or received artificially inflated/deflated prices as a result of the violations of the Exchange Act as detailed herein.

154. By reason of the foregoing, the Brokerage Firm Defendants and the HFT Defendants violated §20A of the Exchange Act and are liable to Plaintiffs and the Plaintiff Class for the substantial damages they suffered in connection with their purchase and/or sale of publicly traded stock and stock options during the Class Period.

PRAYER FOR RELIEF

WHEREFORE, Plaintiffs pray for relief and judgment, as follows:

A. Determining that this action is a proper class action, appointing Plaintiffs as lead Plaintiffs and approving Plaintiffs' selection of Lovell Stewart Halebian Jacobson LLP as lead counsel, and certifying Plaintiffs as a class representatives under Rule 23 of the Federal Rules of Civil Procedure;

B. Declaring this action to be a proper defendant class action maintainable pursuant to Rule 23 of the Federal Rules of Civil Procedure and declaring the Brokerage Firm Defendants and HFT Defendants named herein to be proper representatives of the Defendant Class;

C. Awarding compensatory damages, including interest, in favor of Plaintiffs and the other members of the Plaintiff Class against all Defendants, jointly and severally, for all damages sustained as a result of Defendants' wrongdoing, in an amount to be proven at trial, including interest thereon;

D. Awarding equitable restitution of investors' monies of which they were defrauded

and disgorgement and/or the imposition of a constructive trust on Defendants' ill-gotten gains;

E. Awarding forfeiture in favor of the Plaintiff Class against all Defendants for all illicit fees, commissions and any other compensation paid by Plaintiffs and Plaintiff Class members;

F. Awarding equitable and/or injunctive relief in favor of the Plaintiff Class against Defendants and their counsel, agents and all persons acting under, in concert with, or for them, including: (i) an accounting of and the imposition of a constructive trust and/or an asset freeze on Defendants' unlawful trading proceeds and illicit profits from the conduct detailed herein; (ii) prohibiting HFT traders from engaging in preferential and predatory order placement, electronic front-running, rebate arbitrage, slow-market arbitrage, spamming, spoofing, quote spamming and/or contemporaneous trading; (iii) prohibiting the Brokerage Defendants from failing to pass through any rebates paid or trading fees charged by the Exchange Participants for placing trades on their exchanges to brokerage customers; (iv) prohibiting any HFT Defendant from designating a proprietary order or bid cancellable within one second of placing that proprietary bid or order and prohibiting the Exchange Participants from including any non-firm quotes in the national best bid and offer; and/or (v) prohibiting alternate trading systems from paying rebates to brokerage firms for placing customer orders and bids on those exchanges;

G. Awarding Plaintiffs and the Plaintiff Class their reasonable costs and expenses incurred in this action, including counsel fees and expert fees; and

H. Such other and further relief as the Court may deem just and proper.

JURY DEMAND

Plaintiffs hereby demand a trial by jury.

DATED: June 13, 2014

LOVELL STEWART HALEBIAN JACOBSON LLP

A handwritten signature in dark ink, appearing to read "Victor E. Stewart", is written over a horizontal line.

Victor E. Stewart (VS 4309)
61 Broadway, Suite 501
New York, NY 10006
Telephone: (212) 608-1900
Facsimile: (212) 719-4677
Email: victornj@ix.netcom.com
Counsel for Plaintiffs

PLAINTFF CERTIFICATIONS

CERTIFICATION OF NAMED PLAINTIFF JAMES J. FLYNN
PURSUANT TO FEDERAL SECURITIES LAWS

James J. Flynn ("Plaintiff") declares:

1. Plaintiff has reviewed a complaint and authorized its filing.
2. Plaintiff did not acquire the security that is the subject of this action at the direction of plaintiff's counsel or in order to participate in this private action or any other litigation under the federal securities laws.
3. Plaintiff is willing to serve as a representative party on behalf of the class, including providing testimony at deposition and trial, if necessary.
4. Plaintiff made transactions in securities that are the subject of the complaint during the Class Period (from 04/18/09 through 03/31/14) consisting of approximately 55,000 shares for a total value of approximately \$ 40,000 as follows:
5. Plaintiff has not sought to serve or served as a representative party in a class action that was filed under the federal securities laws within the three-year period prior to the date of this Certification except as detailed below:

NONE

6. The Plaintiff will not accept any payment for serving as a representative party on behalf of the class beyond the Plaintiff's pro rata share of any recovery, except such reasonable costs and expenses (including lost wages) directly relating to the representation of the class as ordered or approved by the court.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this 12d day of June, 2014.

By: 
JAMES J. FLYNN

8 Hovenkamp Avenue
Nanuet, NY 10954

CERTIFICATION OF NAMED PLAINTIFF JAMES J. FLYNN
PURSUANT TO FEDERAL SECURITIES LAWS

James J. Flynn ("Plaintiff") declares:

1. Plaintiff has reviewed a complaint and authorized its filing.
2. Plaintiff did not acquire the security that is the subject of this action at the direction of plaintiff's counsel or in order to participate in this private action or any other litigation under the federal securities laws.
3. Plaintiff is willing to serve as a representative party on behalf of the class, including providing testimony at deposition and trial, if necessary.
4. Plaintiff made transactions in securities that are the subject of the complaint during the Class Period (from 04/18/09 through 03/31/14) consisting of approximately 800 contracts at approximately \$ 46,000.
5. Plaintiff has not sought to serve or served as a representative party in a class action that was filed under the federal securities laws within the three-year period prior to the date of this Certification except as detailed below:

NONE

6. The Plaintiff will not accept any payment for serving as a representative party on behalf of the class beyond the Plaintiff's pro rata share of any recovery, except such reasonable costs and expenses (including lost wages) directly relating to the representation of the class as ordered or approved by the court.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this 12d day of June, 2014.

By: 
JAMES J. FLYNN

8 Hovenkamp Avenue
Nanuet, NY 10954

CERTIFICATION OF NAMED PLAINTIFF DOMINIC A. MORELLI
PURSUANT TO FEDERAL SECURITIES LAWS

Dominic A. Morelli ("Plaintiff") declares:


1. Plaintiff has reviewed a complaint and authorized its filing.
2. Plaintiff did not acquire the security that is the subject of this action at the direction of plaintiff's counsel or in order to participate in this private action or any other litigation under the federal securities laws.
3. Plaintiff is willing to serve as a representative party on behalf of the class, including providing testimony at deposition and trial, if necessary.
4. Plaintiff made transactions in securities that are the subject of the complaint during the Class Period (from 04/18/09 through 03/31/14) consisting of approximately 100 shares for a total value of approximately \$ 100,000 as follows:
5. Plaintiff has not sought to serve or served as a representative party in a class action that was filed under the federal securities laws within the three-year period prior to the date of this Certification except as detailed below:

NONE

6. The Plaintiff will not accept any payment for serving as a representative party on behalf of the class beyond the Plaintiff's pro rata share of any recovery, except such reasonable costs and expenses (including lost wages) directly relating to the representation of the class as ordered or approved by the court.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this 12d day of June, 2014.

By:  6/13/14
DOMINIC A. MORELLI

37 Nimitz Road
Yonkers, New York 10710